STATE OF CALIFORNIA

ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

Preparation of the *1997 Fuels Report*)	**Docket No. 96-FR-1**

1997 Fuels Report

Fuels and Transportation Committee Hearing

World Oil Supply and Production Issues

Thursday, August 21, 1997
10:00 a.m.

Held at the:

California Energy Commission

1516 Ninth Street, Hearing Room A

Sacramento, California

REPORTED BY: G. PALMER

COMMISSIONERS PRESENT

JANANNE SHARPLESS, Commissioner and Presiding Member

MICHAL C. MOORE, Commissioner and Associate Member

STAFF PRESENT
(Alphabetically listed)

SUSAN BAKKER, Advisor to Commissioner Moore

GERALD R. BEMIS, P.E., Fuels Office

TOM GLAVIANO, Energy Information and Analysis Division

JAIRAM GOPAL, Energy Information and Analysis Division

ROBERTA MENDOSA, Public Advisors Office

JIM PAGE, Energy Information and Analysis Division, Fuels Office

GORDON SCHREMP, Associate Energy Specialist

ROSELLA SHAPIRO, Advisor to Commissioner Sharpless

ALSO PRESENT
(Alphabetically listed)

KEN DESPOT, Engineer, Golden Bear Oil Specialties

EDWARD N. KRAPLES, President, Energy Securities Analysis

CHUCK MORGAN, Manager, Western Region, Mobil Oil Corporation

INDEX

1997 Fuels Report Hearing, August 21, 1997

Thursday, August 21, 1997 10:17 o'clock a.m.

P R O C E E D I N G S

PRESIDING COMMISSIONER SHARPLESS: Sorry for the delay. I want to welcome everybody today to the topic: World Oil Supply and Production Issues. And I'm Jan Sharpless.

To my right is Commissioner Michal Moore and to my left is my Advisor, Rosella Shapiro.

We comprise the Fuels and Transportation Committee. And this is our second in a series of three hearings. Our first hearing was on August 14th. And at that hearing we explored several issues concerning natural gas. Next week's hearing or the next hearing we have -- excuse me, not next week -- is on September 25th where we will be focused on California's gasoline refining concerns.

The topics of today's hearing are to look at several market trends, such as world oil supply and demand; the role of Mideast oil, the role it has on global supply and demand; and the implications for California of declining supply to the state from our current sources.

We will also discuss possible policy options to address the potential for future price increases that might occur as a result of either supply and production trends.

This hearing is being conducted to provide part of the

record for the Energy Commission's *1997 Fuels Report*, which is biennial report that provides industry and decisionmakers with objective information on fuels in California.

I'd like to turn to the Agenda. And I hope you all have a copy. You will notice that we have a Staff presentation this morning, as well as an expert witness presentation, on the world oil outlook and Pacific Rim oil issues.

In the afternoon we will be looking at production issues. I understand that two of our witnesses will not be able to attend, although their presentations will be provided and covered, I believe, partially by Staff.

Is that correct, Mr. Glaviano?

MR. GLAVIANO: Yes, it is. The Arizona, Chuck Morgan presentation will be covered by Staff.

The Bob Cunningham presentation will be postponed until the September 25th hearing.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. GLAVIANO: And he will then present the full testimony.

PRESIDING COMMISSIONER SHARPLESS: Fine.

In preparing the biennial *Fuels Report*, the Commission continues to reevaluate state and global crude oil and other energy markets, Staff analyses of historical trends, project the price and supply of all fuels consumed in the state. Results of these analyses and the impacts of the changing market conditions

on future availability are important to assure that policymakers and market participants have access to objective and reliable information on emerging fuels trends and the expected impacts of policy changes.

I'd like to just note, as a procedural process with this hearing, these are informal hearings. We do, however, ask you, if you wish to testify or make a presentation before the Committee, if you will, in fact, fill out one of these blue cards. Our Public Advisor is standing at the rear of the room. Her name is Roberta Mendosa. She will be helpful if you wish either a blue card or have other questions or need something during the hearing.

The Committee Hearing is being recorded, as I say. This builds a record on which we will be making our findings and conclusions for our *Fuels Report*. I would ask that, if you do have comment during this hearing, you make your comment at the microphone, and at the time you give your name and affiliation so we'll know who are you.

With respect to any comments or additional written material that you would like to provide in this hearing, we have noted in the Notice of Hearing scheduled for today that you may submit your written comments up to the close of business Tuesday, August 25th. So you have additional opportunity, through written comment, on any subject that we touch today.

With that I'll ask Commissioner Moore if he has any

special comments that he would like to present at this time, and we can proceed with the presentations.

COMMISSIONER MOORE: I only have one remark and that is that the hearings, it seems to me, with regard to what's happening on the world oil scene are particularly timely, so I'm looking forward to the results and the numbers.

PRESIDING COMMISSIONER SHARPLESS: Great. Well, we'll turn to Staff and ask Staff to -- I guess, Mr. Bemis, you're going to be making the opening remarks before Staff presents their issue paper.

MR. BEMIS: Thank you.

Historically, as the Commissioner said, the fuels-related work focused on issues of the day which were then adopted every two years in the *Fuels Report*. Just this May the Energy Commission adopted a Strategic Plan. That Strategic Plan is consistent with many of the Fuels Office's activities, and you can recognize them. And I want to show you some of them as we go through it, so I'll briefly walk you through some of those.

First, a Mission Statement: "It is the California Energy Commission's mission to assess, advocate and act through public/private partnerships to improve energy systems that promote a strong economy and a healthy environment."

Certainly fuels are an essential element of a strong economy and can be a component of a healthy environment.

This process we're going through today I see as a public/private partnership, where we're soliciting input from industry to help us make more informed public decisions.

The document includes a vision: "It is the vision of the California Energy Commission for Californians to have energy choices that are affordable, reliable, diverse, safe and environmentally acceptable."

Turning now to the roles, what do we do to achieve that vision and implement that mission.

Role 1 says: "[Develop] energy public policy recommendations based on relevant, objective information ... that promote affordable energy supplies, improve energy reliability and enhance health, economic well-being and environmental quality."

There are several strategies. Strategy 1 says: "Continuously evaluate California's energy systems, including electricity, natural gas and transportation, and recommend changes to improve all aspects of these systems."

Let's look at Strategy 3 of Role 1. It says: "Retain the 10- to 20-year focus for evaluating the state's long-term energy outlook."

In a few minutes we'll hear from Jim Page. And he will take a look at long-term oil price projections to see what we think the average price of oil will be over that time period.

"An important role ... is to look beyond the short-

run market horizon and assess the general trends in energy use, ... the source and security of supply, the potential for price instability, and the environmental implications of the projected level of energy use."

Next let's look at the information role. It says we should "Collect targeted energy data and provide policy makers, consumers and other market participants with useful, objective information and analyses based on that data." And we collect a lot of oil company information through the PIRA process.

Strategy 1 of this role says: "Meet energy information needs for informed government actions and to facilitate well-functioning markets." Certainly that has to include oil and gas.

Strategy 3 of that role says: "Develop and apply methods, analytical tools, expertise and data to evaluate entire energy systems for all forms of energy, and make the results available to policy makers and market participants." That's what we're doing here.

Finally, Strategy 6 of that role says: "Change the time-frame of market sensitive-analyses from a long-term focus to a two- to six-year time-frame to increase its utility and value to market participants." So that says that there's a need for a long-term focus and a short-term focus.

Let's look briefly at Role 3, which is titled "Market Programs." Market Programs says: "Provide services and

programs to improve the functioning of energy markets for all forms of energy."

Strategy 1 of that role says: "Examine end-use energy markets and address barriers that are current impediments to achieving well-functioning markets."

And finally Strategy 4 of that role says: "In partnership with public and private stakeholders, help reduce market barriers and capture opportunities to facilitate market transformations of advanced electricity, fuel and transportation technologies to provide public benefits."

So that gives you a highlight of several of the roles and strategies that, at least I think, we address in our ongoing programs within the Fuels Resources Office.

Thank you.

PRESIDING COMMISSIONER SHARPLESS: Does that bring us to Mr. Page?

Mr. Page, would you please begin your presentation?

MR. PAGE: Thank you, Commissioner Sharpless.

Good morning, Commissioners and Advisors. I'd like to provide some background and discuss the information from Staff's world oil market analysis, including why we do it, which Gerry has alluded to in general terms; how it was done; what information was obtained; and how it might be interpreted.

World oil prices are the focus of this analysis and presentation. Although California currently gets over 90

percent of its oil from either instate or Alaskan sources, in a global oil market these domestic oil prices are highly correlated with and driven by world oil prices.

This oil price forecast, which I'm getting to, is primarily used as an input to other Commission functions. The oil price forecast is the first step in projecting petroleum product prices, and especially transportation fuel price forecasts that are used in transportation energy demand forecasting analyses and in transportation energy planning and policy analyses.

It's also used as an input to natural gas price forecasting. So indirectly it's important in electricity analyses as well.

And, finally, it's important indirectly in evaluating potential alternative fuel and energy efficiency measures and technologies.

The primary method in the past, which the Commission has used to forecast energy prices, has been the Delphi Survey. For about twelve years now, in nine surveys, we've employed this method. Basically it's pretty simple. We send a questionnaire to about twenty or more energy experts.

They give us their expectations of growth rates of oil prices in the future, return the answers to us. We aggregate them, which means basically averaging the results, send them back to them. They return, in a second round, if they want to

change their answers in light of the group's results, they can. After the second round we basically publish the results and use that survey as our oil price forecast.

The method is fairly simple and straightforward. And it gives us a very unambiguous answer to what our oil price is going to be. It's to the penny, year by year, for twenty years.

However, this Delphi Survey has come under much criticism over the years. And, while my view is probably not so harsh as others, I think there are uses to it, I think we have strained its credibility using it as our sole method of adopting these oil price forecasts.

Aside from some minor survey methodology concerns, the main problems are a lack of common assumptions with these forecasts. We know, inspite of the specificity and preciseness of the numbers, we know nothing about the world that's being projected. Even if we could figure out what individuals saw the world to be like, when you average it out what does any of that mean?

A second -- and we've tried to address this, to figure out ways to enhance the questionnaire to get more information about this future world. The problem is a lot of these people are basically doing this as a favor for us. They do it because it's simple. It doesn't take much time; we're not paying them.

Almost every solution to this problem of what world are we talking about requires piling on questions to the point where

the whole process would become too burdensome for these people to participate.

A second problem is its hard to use or acquire statistics for variation. By that I mean: How much are prices going to vary year to year around some central tendency or long-term equilibrium price. And I think that this is an underanalyzed part of probably all of our price forecasting for all fuels. And I'll get into that more as we go through this analysis. In fact, I'll keep returning to that pretty regularly.

Finally, the Delphi gives us a very inflexible number, a set of numbers, if you will. Staff can't do much with it. We get these numbers; it's pretty arbitrary. If we don't like something about it, we're stuck with it in whatever use we may be trying to put the survey to.

The only other means by which the Commission's attempted or Staff have attempted to get at this question of what will oil prices be in future was through scenario planning.

And we did this once, for the *1989 Fuels Report*. And, as you know, scenario planning is a means of constructing alternative futures that differ basically on outcomes of important variables that at this point would be uncertain. So we take different courses of that uncertainty playing itself out and then to derive what kind of world that would mean.

So, inherently, scenario planning tells you why things

happen, because that's how you build the scenarios. It is also addresses uncertainty directly and explicitly. However, it's very time-consuming. If done right, it would involve lots of Staff across offices, management and Commissioners, and probably require a contractor to facilitate. And it takes a great deal of time.

And, finally, there's nothing inherent to the method to give you numbers. There's no quantification process necessarily. Usually you tack on numbers at the end, is what it really amounts to, judgmentally.

COMMISSIONER MOORE: Tack on what kind of numbers?

MR. PAGE: Well, if it was oil prices, the trajectory of oil prices, it might be consistent with these scenarios. I'll show an example of that later on. In fact, I will go into --

COMMISSIONER MOORE: Well, as opposed to the fact that you're getting, out of the Delphi survey you're getting real numbers?

MR. PAGE: Right. Precise numbers, yes.

COMMISSIONER MOORE: And then you're going to extrapolate those. And then based on the different scenarios that you plot, the extrapolations will change, right? But you're still working with a base set of real numbers, whether they are accurate or not?

MR. PAGE: No. The Delphi has no relationship, the

Delphi process has no relationship to the scenario-planning process.

COMMISSIONER MOORE: It doesn't establish the base numbers that you're going to work from?

MR. PAGE: No. Well, in fact, when we did the *89 Fuels Report* scenarios with GBN, they were, I guess it is fair to say, disdainful of the Delphi and didn't want anything to do with it.

PRESIDING COMMISSIONER SHARPLESS: But, and I meant, getting to Commissioner Moore's point, we've put out two *Fuels Report*s since we started the scenario-planning combination with Delphi's Survey.

So to answer Commissioner Moore's, even though in scenario planning it's not meant to be necessarily quantitative, you have to derive your numbers from somewhere.

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: And that means you go back to the experts. And that means that you look at what the experts say. And then you try to come up with some judgments about how to interpret what the experts are saying. You have to come up with a number.

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: I think what Commissioner Moore was getting to was: Where do you come up with that number? How do you fix that number if you don't use a

Delphi Survey methodology-type process?

MR. PAGE: Well, for those scenarios we had, through GPN, we had contact with energy experts who were not a part of the Delphi, who could in a sense be a part of the scenario process and give us some perspective in these alternative outcomes of world of what their opinion --

PRESIDING COMMISSIONER SHARPLESS: So even though it wasn't called Delphi, the process was similar --

MR. PAGE: Yes. There was --

PRESIDING COMMISSIONER SHARPLESS: -- in terms of coming up with a number.

MR. PAGE: There was a judgmental process with --

PRESIDING COMMISSIONER SHARPLESS: Right.

MR. PAGE: -- various persons involved. Of course, -- but the Delphi -- again, there was no buy-off by the Delphi panelists on any of these assumptions to any of these scenarios.

COMMISSIONER MOORE: No. It just sent you your numbers, and then you did the analysis from what they sent you.

MR. PAGE: Right. That's --

COMMISSIONER MOORE: It wasn't a Delphi focus group. It was a Delphi response to a questionnaire.

MR. PAGE: Right. For all of our Delphi Surveys.

PRESIDING COMMISSIONER SHARPLESS: And what I'm trying to get clear is in the '91, '95 round, where we were using --

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: -- Delphi Survey methodology and scenario planning, we basically did, in those two reports, a blending, did we not?

MR. PAGE: Well, we didn't do scenario planning after '89.

COMMISSIONER MOORE: That was the only time we did it.

MR. PAGE: That's the only time we did it.

PRESIDING COMMISSIONER SHARPLESS: We only did it then, but we used the scenarios we had established in '89 and '91 and '95. We didn't trash them. We're still using scenarios in '91 and '95, right, because they're referenced in your issue paper here as two of the scenarios that had been developed, I think, back in '89.

MR. PAGE: In '89. But I'm not so sure they were really used much after that '89 process.

I've sort of -- I mean I almost feel like I've sort of brought them back to life. And this is the first time I'm aware of them being referred to since '89.

PRESIDING COMMISSIONER SHARPLESS: Okay. I guess perhaps I thought we had talked about them during the '95 process. But I have to admit that I came in in the last two months of the '95 process.

MR. PAGE: I may be unaware of that, yes.

PRESIDING COMMISSIONER SHARPLESS: Okay. Fine.

MR. PAGE: Certainly.

PRESIDING COMMISSIONER SHARPLESS: It's good to clear up. Thanks.

MR. PAGE: Some other methods that might be available to be used, one I think could be employed, and I have done that and will do that today, is trend extrapolation of historical data. We could use other available forecasts, nonDelphi, just search through the literature a little more widely, or we could go into computer modeling, either inhouse or contracted.

And I guess my approach for this paper was to really play no favorites methodologically, to try and use and link all the methods as best as I could, play to their strengths, if you will, and away from their weaknesses, and use a lot of judgment about when to drop one approach and start looking for information from another.

As far as the information developed in this analysis, I'd like to show a series of overheads from the paper. You have that, just the overheads. To people in the audience, you can follow along in the paper, the figure titles will be the same.

And starting with historical information, Figure 1, 1968 through '96, I've tried to keep it consistent. Everything is in '96 dollars. The index is the U.S. Refiner Acquisition Cost of Imported Crude. It's readily available, the numbers, and suitable, I think, for our purposes.

And what I find leaping out at me from this diagram, --

COMMISSIONER MOORE: No pun intended.

MR. PAGE: -- is how easy it is to divide it into three periods. And I think they are periods distinguished by their pricing regimes that were dominant during those periods.

For instance, in pre-1974 we have an era largely oil price controls, which meant low refinery feedstock prices, high refinery margins even at low product prices and, therefore, very high demand growth on the order in the U.S. of four to five percent or more per year.

However, this high demand growth, when you couple it with the growing nationalization of energy industries in important oil-producing countries and the high level of imports to the U.S. and other countries and the high OPEC market share that had developed by this time -- roughly in the order of 55 percent of world production was from OPEC in 1973 -- this led to an era, I'll call it the "cartel period," where OPEC had the market power to set prices.

So it was a period dominated by official OPEC pricing and high prices. And too high, as it turned out, for their own good, because this led immediately to declining demand in the U.S. It wasn't just slowing down the growth. It actually started to decline, the demand for oil, due to, among other things, conservation, efficiency, fuel substitution. And, on

the other side of the coin, the supply side, the growth of nonOPEC supply.

And, through all of this, these high prices basically were spurring technology on both the supply and demand side to respond, to come up with alternatives. And with the consequence that in '86 prices crashed, and we entered into a pricing regime dominated by spot pricing and increasingly influenced by futures markets.

This was a period of moderate prices, but very volatile prices in the short term. And, consequently, a fairly moderate demand growth, on the order of one percent or a little over, in the U.S. per year.

And, while the two prior periods were not sustainable for the reasons I've discussed, I think the question is now: Is this third regime, pricing regime, is it sustainable? Is this a stable or sustainable market?

So I want to focus on this period in Figure 2.

PRESIDING COMMISSIONER SHARPLESS: What do you mean by "stable market," as stable as projected by stable prices?

MR. PAGE: Yes. Stable around this notion that there's some sort of equilibrium price around which --

PRESIDING COMMISSIONER SHARPLESS: Right.

MR. PAGE: -- prices will fluctuate but return at moderate levels, and certainly not at the levels we saw in the

prior periods where prices were controlled at either high or low levels.

COMMISSIONER MOORE: Is it fair to contrast with the other definition of stability that you might have used, which is that it's a stable regime, that the world of spot pricing and futures contracts and derivatives is the future we will live with for a long, long time, that, in fact, there may be several levels of equilibrium.

So Jan asked the question that led to the answer of stable prices, but there's another answer which is a stable mechanism. It's the one that will get used. And that may not result in stable prices.

MR. PAGE: "Stable" is a dangerous word in this context. And I've tried to train myself not to say it, but "sustainable" is more --

COMMISSIONER MOORE: It slipped out. I know.

MR. PAGE: Yes. Yes, your point is well taken.

PRESIDING COMMISSIONER SHARPLESS: But that's the parlance of world oil, "stable volatility." How do you get away from it, right?

MR. PAGE: Right. Well, and then the question is: Is price volatility a negative thing? If it leads to moderate prices over a long period of time is this something we should just learn to live with, is this a positive element, this feedback system?

COMMISSIONER MOORE: Well, I guess, in that case, it matters whether you care about the margin or whether you care about the average, the average cost curve or the marginal cost curve. So, depending on which one of those you want to focus on, your answer is going to be different.

MR. PAGE: Right. And I guess --

PRESIDING COMMISSIONER SHARPLESS: Of course, I think it has to do with the political environment we live in --

MR. PAGE: Correct. Right, exactly.

PRESIDING COMMISSIONER SHARPLESS: -- as well as margins. I know. God, I hate it. Okay.

MR. PAGE: Just to recap these years, and I'll try to go through it quickly.

We see the price crash in '86 and a period of transition following that where the market didn't seem to know where prices needed to be. And before that it had been shaken out, we were hit with the Gulf War. Prices spiked. As soon as the bombs fell on Baghdad, however, the prices started falling and basically didn't stop for several years.

This was partly a result of this tide of technological improvements on the supply-and-demand side. It finally filtered through the system. These investments in response to high prices in the early '80s were kind of coming home to roost, so to speak.

PRESIDING COMMISSIONER SHARPLESS: So there was a time period of, what, eight years before the technological lag?

MR. PAGE: Well, probably even more because the high prices started in the late '70s.

The statistics for this period are, if you average them, approximately a $20 central tendency for this period, and a standard deviation of about $2.70.

And I think, if you look at the figure, I see, like I say, a sense of oscillation or a return to moderation in the pricing. It seems not to be cyclic, regularly cyclic. It seems to be a tendency to return to a more moderate price level if it tends to deviate too far.

And so how could we extrapolate a trend from this data into the future, if we were to choose this method, say, of projecting prices? I think we could use the average and the standard deviation I've just described, and say in the future we'll have $20 flat real oil prices and roughly this variation represented by a standard deviation of about $2.70.

PRESIDING COMMISSIONER SHARPLESS: And, again, this is a method of looking historically? When you say "using this method," you're saying using historical...

MR. PAGE: Deriving from historical data a sense of where the future might go, right.

COMMISSIONER MOORE: The trend line. You continue the trend line.

MR. PAGE: Right.

COMMISSIONER MOORE: And if this is your only data set, you almost get one that goes down.

MR. PAGE: Yes.

COMMISSIONER MOORE: I mean if I'm just looking at that, there's a slight down.

MR. PAGE: Right. And I'll get into -- there's sort of three options that I teased out of it. Like I say, the first was $20 flat, but there's certain other assumptions in this.

The one assumption, the major assumption, about that is that events, disruptive events like a Gulf war, happen every once in a while. And on average we've had about one of these kind of mega events in the market every decade.

So if we're going to err on the safe side maybe, we might anticipate something like that in the future and build that into our assumptions about where this trend line is going.

We've had some time, as you say, to come down off of the Gulf War event. But are there those events lurking in the future? And this trend line would assume that there are.

However, you could also say that with the Gulf War it sort of changed things, that the use of oil as a weapon was totally discredited with that event. Not only that, but the world oil market's response to that event was very different than the Iran-Iraq War or the Iranian Revolution or the Arab Oil Embargo. Much shorter and direct, more direct return to

normalcy, so to speak.

So you might argue that these events really aren't going to occur any more. They're no longer a significant factor in our thinking. The supply-and-demand fundamentals, oil is just a commodity. That's all it is any more.

And the trend you would want, or the data you would want to use in that regard is to start post-Gulf War. Average that data out. And it still tends to oscillate around a central tendency, an average of about 18.75. It has a smaller standard deviation of about $1.80. So it's a tighter band of variation and lower prices. But you could still argue that that one might be a flat trajectory.

And a final, but importantly, events, these disruptive events in the Middle East or elsewhere, are no longer important factors to consider in the thinking.

And finally you could say, blend the two, and say that, 'Well, the importance of these events are diminishing, but they still could happen.' You might, say, start at $20 and have a trend line that declined maybe to 18, or pick your number, but declining, as you say. There's a trend of declining real oil prices.

And before I leave this figure I want to leave you with one image. I won't talk too much about it. But statistically 1996 was an up year, but pretty average, ordinary year, around the $20 long-term average.

But seen on a daily basis, Figure 3, it can be highly volatile, around -- even in a so-called average year it can be all over the place.

And, again, you get back to this question of how do we think about volatility and price variation, if you will, in our forecasting. It really has never been --

PRESIDING COMMISSIONER SHARPLESS: Well, not only that, but how are we, I guess thinking about it, but -- we look at long-range planning, and it kind of smooths out what looks like a heart attack, cardiology chart. Or are we looking short term to smooth out some of the three- to four-month high-spike events that might happen in a state like California.

So I guess the question becomes: How are we using the tool for planning purposes or for information purposes, right?

MR. PAGE: Precisely, yes.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. PAGE: And I don't have really a lot of answers to offer at this point. But I think it's something that needs to be discussed throughout the Commission as oil prices feed into petroleum product prices or any other prices, and then those are used in demand forecasts and policy analysis. A consciousness has to be retained. Prices do not -- although we might suggest long-term prices are $20 flat, that's a pretty deceptive image if you don't also say: But year-to-year

volatility could be on the order of 2- to 3- to $5 and daily variation similarly around any yearly average. So just as long as we're conscious of that as we go.

I'd now like to remove from historical oil prices to projected prices from numerous available forecasts. And we'll start with the Delphi. I'll try and go through this fairly quickly.

In Figure 4 we have the most likely cases for world average oil prices. The earliest Delphis were extremely high and steep. Delphi 1, as you probably know or have heard, saw $100 oil for 2002 and $96. But --

PRESIDING COMMISSIONER SHARPLESS: Could you just explain for me, when you're talking about Delphi 5 or 6 or 7 or 8 or 9, are these people or are these actual surveys that represent more than one person?

MR. PAGE: These are surveys of probably 18 to 25 experts.

PRESIDING COMMISSIONER SHARPLESS: Okay. So Delphi 5 --

MR. PAGE: Their averages.

PRESIDING COMMISSIONER SHARPLESS: Okay. So Delphi 5 represents 18 --

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: -- people's --

MR. PAGE: Roughly.

PRESIDING COMMISSIONER SHARPLESS: -- averaged view?

MR. PAGE: Right.

COMMISSIONER MOORE: But in successive cases it may have been some of the same people involved?

MR. PAGE: Correct.

COMMISSIONER MOORE: May have surveyed the same people.

MR. PAGE: Right. And --

PRESIDING COMMISSIONER SHARPLESS: At different points in time?

COMMISSIONER MOORE: At different points in time.

MR. PAGE: Yes. Every year or two --

COMMISSIONER MOORE: So Delphi 9 is a different time period than Delphi 5, but it may involve some of the same actors.

MR. PAGE: Correct.

And we have some attrition every year or every successive survey. We try and get all of them back, but we don't, not all of them.

COMMISSIONER MOORE: You don't attrit the ones who got it wrong?

MR. PAGE: That's been suggested. Attrit everyone but the one who got it right the most times, and then hire that person.

COMMISSIONER MOORE: Yes. Right.

PRESIDING COMMISSIONER SHARPLESS: But they may be right just once. The time you attrited them out, right?

MR. PAGE: Yes.

MS. SHAPIRO: And, Jim, we can tell when it was done by when it starts, where it starts on the graph?

MR. PAGE: Correct, yes.

PRESIDING COMMISSIONER SHARPLESS: Oh, I see.

MS. SHAPIRO: So Delphi 5 it started, it looks like, in --

COMMISSIONER MOORE: Right. Exactly what you would expect. They have --

MR. PAGE: Right. That would --

MS. SHAPIRO: '87, the '87 Delphi is Delphi 5 -- no. We didn't do Delphi in '89. We did Delphi in '89?

MR. PAGE: Well, more or less. I mean it would depend. The start year may or may not be an actual or part of an actual year or a projected year but, roughly, yes, that's approximately right.

MS. SHAPIRO: Okay.

COMMISSIONER MOORE: So, just in looking at this, you could say that either they're reflecting a better understanding of the market. Or, if you looked at those, you would say, just as a snapshot, these people being surveyed are getting more conservative over time --

MR. PAGE: Yes. Might be getting tired of being wrong.

COMMISSIONER MOORE: -- in their outlook. Just being safer, just taking a safer look at that. Is there any tendency to just be safer?

MR. PAGE: Well, I think when you're, as I said, wrong year after year, that your prices forecasts are too high year after year, --

COMMISSIONER MOORE: Well, but --

MR. PAGE: -- in the face of actual prices, --

COMMISSIONER MOORE: Yes. But under those circumstances, after year 2, you would have had someone go, "Oops," and suddenly you'd be down to the Delphi 9 line. I mean something else is going on there, because you're moving very gradually down.

MR. PAGE: Yes.

COMMISSIONER MOORE: So in this reiterative process --

MR. PAGE: Right.

COMMISSIONER MOORE: -- something else is happening other than -- either reading the market better incrementally, or they're starting to get more and more conservative in their outlook, which suggests that in about two more iterations everybody's going to be on your $20 line.

MR. PAGE: Or at least a flatter line, that depending

-- and, of course, a lot depends on the prices at that point in time when they serve -- because that always serves as a starting point. That's why Delphi 9, in fact, is higher than Delphi 8 because the starting point is higher. Their trajectories are roughly the same.

PRESIDING COMMISSIONER SHARPLESS: And there's things that happen other than geopolitical wars that could have an impact which people do not anticipate, --

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: -- even the experts in this area, something dealing with world decisions on global climate change, something, an environmental atrocity that happened that caused world reaction to it.

MR. PAGE: Right. Right. Or weather. I mean --

PRESIDING COMMISSIONER SHARPLESS: Well, that's what I'm --

MR. PAGE: -- if you go through a hard winter, you know, --

PRESIDING COMMISSIONER SHARPLESS: A terrible, terrible winter.

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: Right.

MR. PAGE: So, yes. Then we've obviously noted the trend toward flatter and lower prices. But throughout the Delphi and, therefore, the Commission have projected rising real

oil prices.

I'll go to Figure 5 now for some alternative forecasts. I'll start with the DOE's reference cases from their annual outlooks.

PRESIDING COMMISSIONER SHARPLESS: Do they use mainly historical methodology?

MR. PAGE: They have a computer model, --

PRESIDING COMMISSIONER SHARPLESS: Oh, they have a computer model.

MR. PAGE: -- inhouse, yes.

And I've thrown the IE, International Energy Workshop modeling form in there. That probably wasn't very nice of me, but I did.

The DOE, however, you see sort of a similar trend to the Delphi from the '95 outlook and the '96 outlook, were traditional, kind of high-rising price forecasts. With the last one, however, they dug deep into their model and really changed things to a much lower and flatter oil price forecast.

And, likewise, if we go to Figure 6, the Canadian Energy Research Institute's reference case forecasts, we see version 6, a typical high forecast in the old sense, but recent versions have sharply lowered and flattened their projections. And the note that the CERI Index is for West Texas Intermediate, a higher-priced oil, so you actually have to drop this line even lower to compare it to the historical record.

And there are other forecasts. I've tabulated some that are in the paper. I don't have an overhead for them. But basically they've confirmed this trend to flatter and downward prices, most of the numbers below $20.

So while this is collectively not exhaustive of the available forecasts, I think it makes the point pretty convincingly, that this conventional wisdom among oil price forecasters is starting to converge on a trend you might extrapolate from the data, historical data, as we just did before.

And maybe that shouldn't be surprising, that a conventional wisdom should look like a trend extrapolation. But, as we've noted, as recently as a couple of years ago, it wasn't. This is sort of news.

And now I'd like to move on to the scenario planning approach to this problem by first reviewing the *'89 Fuels Report* scenarios and then going on to the new -- I wouldn't called them "improved," necessarily, scenarios -- but more focused oil market scenarios. And then I'll briefly summarize the computer modeling that I did to accompany or help support quantifying these scenarios, the newer scenarios.

As I noted before, in 1989 Staff and the Commission and a global business network generated world oil market scenarios. And, of course, '89 was a very fascinating time to do this kind of work because the Soviet Bloc was disintegrating; China and

Asia Pacific were just beginning their booms; Latin America and most of the developing world was really a big question mark. No one knew what they were going to do, what was going to happen there politically or economically; we had just come out of the Cartel era; hadn't had the Gulf War yet; and then the free trade pacts were just beginning, were just controversial ideas at this time.

And the two scenarios that were developed basically revolved around this notion of a global economic integration. Is it going to work or not? In a nutshell, that's kind of how I would summarize them.

The first scenario, "OPEC Resurgence," said it wouldn't. It wasn't going to happen. Characterized by regional trade barriers, limited diffusion of new technology, constrained energy supplies and an OPEC-managed oil market. And if we look at Figure 7, we'll see the oil price projection that was -- through our scenario process we assume would accompany these conditions.

And I think neither by the logic, that I've just described these characteristics, nor by the performances of the oil market, at least indicated by prices, can you really say that this scenario pans out.

The second scenario is "Global Economic Cooperation," and if I might read here for a second. It was characterized by: Increasingly free trade, economic growth fueled by technology

development, declining energy intensities, demand for cleaner fuels and technologies, a wider gap between the oil price and the end-use fuel costs, increased transfer of efficient technologies to developing countries, abundant oil due to low finding and producing costs, and OPEC and consuming nations' mutual dependence.

Figure 8 shows the oil price range we considered consistent with the Global Economic Cooperation scenario.

And I think, both by the characteristics of the scenario and the performance of the oil market as, again, indicated by oil prices, I think you get a much better match with the world as it actually turned out.

What I think drives this is what I would characterize an effective and positive synergy between market economics and market growth, technology dissemination and environmental policy. To quote a phrase by Peter Schwartz at a recent hearing, a quote that is not so new really, "Pollution is bad economics." It indicates inefficiency in the system which is basically fatal in a competitive world.

Or put another way: Efficient technology addresses both environmental and economic concerns. Economic growth funds this technology investment. And it is also increases consumer expectations for, among other things, environmental amenities.

And then environmental amenities, likewise, are an element of economic welfare, an important element of economic

welfare.

So we have a kind of a positive feedback system, if you will, all of these factors sort of snowballing with each other.

And I think the logic in this scenario, coupled with this open and then transparent pricing regime, which we've already spoken about, is what I think drives the current world oil market and I think provides its sustainability that we've talked about.

So, when I went to the new scenarios, I didn't want to reinvent this logic. I just carried it over. And part of why I felt justified in doing that is I read a World Energy Council document.

There they've created some very long-range scenarios for the base of the twenty-first century. And they incorporated also most of these assumptions about continuing steady economic growth in developing countries, the spread of technology, availability of energy supplies -- that is they wouldn't limit our options; depletion of energy supplies would not limit us -- and the trend also toward cleaner and more efficient and more flexible energy services.

Now these new scenarios are not anywhere near as global in orientation or as broad as these from '89. They are more focused on the oil market and prices.

The first scenario I called "Established Trends." And, for simplicity's sake as much as anything, I incorporated this

$20 flat trend extrapolation. I'm not wedded to that. This is not in concrete. The numbers are secondary, truthfully, to me.

But what I've tried to do is then set up a benchmark model run with the Canadian Energy Research Institute's World Oil Model. I set up a benchmark model run that's consistent with these kinds of prices. And when I did the other scenarios, I asked myself, 'Okay, if we're manipulating, say, economic variables, what happens when I manipulate economic variables in the model.'

So there isn't really a one-to-one correspondence between these sensitivity cases and any of the other scenarios, the non-basecase scenarios.

I would have, in fact, maybe as many as six or eight or ten different sensitivity cases all testing, for instance, what happens if you manipulate economic growth or demand parameters in a developing region. And I'll sort of give an example of those or go into that as I go.

The second scenario, which is in Figure A-2, is a high demand scenario called "World on Wheels." There seemed to be a lot of interest in the notion of what happens when the developing world, people get enough money and want cars and start driving them. That's sort of representative. There's a lot of consumer goods involved. But the focus seemed to be transportation, if people wanted to start driving.

So I ran maybe, like I say, seven or eight sensitivity

tests with the model to get a sense of what would happen if you change or had these changes on the demand side, if you increased economic growth rates in various regions of the world; if you changed demand parameters, such as incumbent price elasticities of demand, to make them more like developed countries.

And I'll be very interested in hearing what Ed Kraples has to say in this regard later today, because I, frankly, had trouble getting a whole lot of impact in the model from these kinds of demand-side changes, just demand alone, maybe on the order of a couple dollars. And that's basically what I settled on when I graphed this, is a judgmental choice to raise the long-run equilibrium fuel by $2 a barrel. But also there was some delay built in and some gradualness to this thing, because the most recently-developing countries don't have the infrastructure for everybody to be driving a lot.

It's very different than it was in the U.S., where we pretty much or largely put the interstate highway system in place and then everybody kind of started driving a lot. It's sort of backwards for most of the countries in the world today.

The next scenario, Scenario 2a, added to this high demand, this prior higher-demand scenario a set of supply constraints. So in a sense it's a "Worst Case" or high-price scenario. I posited lower-than-expected world oil supply or more rigorous OPEC production restraint and was able to get much larger impacts, roughly on the order of 4- to $7 per barrel in

the various tests that I made.

I felt that probably $5 was a ceiling. And it would probably take a while because I don't, frankly, see much in the world oil market today that's looking like it's going to go that direction. It's a pretty soft market currently. So, again, judgmentally I felt that you could probably push it to the max at about $5 more.

The next two scenarios have the long-term effect of lowering prices. Scenario 3 is called the "Denver Boot" Scenario, because it imposes costs on petroleum use that constrain demand. And most of this is from the policy side, the policy intent being to exact environmental penalties on petroleum fuels and to capture rents on petroleum use that would otherwise go to producing countries. And this is, in fact, already being sensitively employed.

We all know about the high gasoline taxation in Europe and we have our own taxes, but although they're lower -- we also do other things, like reformulate fuels. And that imposes costs on the end use that are not necessarily related to the cost of the oil. In fact, it drives a wedge between the oil price and the product price.

This has the effect, of course, of reducing demand for the product, which reduces demand for the oil which lowers the price of the oil.

The CERI model can indicate very potentially large

effects from the strategy. I guess I'm a little more skeptical. I think there's a lot of hesitation about imposing costs at the end-use side.

I also think there's probably some possibility that OPEC might retaliate, if you will, and restrain their production in response to extensive use or much more extensive use of the strategy. But I think you can get some effect. And I assumed a sort of long, slow transition to an eventual $3 per barrel lowering of long-term average prices.

And, finally, Scenario 3a, Figure A5 is the lowest price because, again, it adds supply-side circumstances to this case, including greater oil resources, stronger performances by the Russian and other developing counties' oil industries and an ineffective OPEC response. And I simply doubled the effect, the ultimate effect. Technology improvements would also be an important factor behind this kind of scenario.

So, in conclusion, I'll note a few things or reiterate a few things. This convergence of the historical and forecasted trends at around $20 per barrel or less, long-run average prices with a flat or declining price trajectory.

Secondly, regarding variation, I think, as I've said, we need to think more about this attribute of a forecast, especially when we're going to flatter and more moderate forecasts, and including how it might affect our demand forecasting, policy analysis and contingency planning.

And with regard to the uncertainty on the low and high side of prices, I see no return to either the good old days of pre-'74 or the bad old days of the Cartel era. In terms of these scenarios that I've presented, I personally find the lower side, lower-price-side scenarios a little more persuasive. But there are scenarios so that everybody can have their input on them.

And, finally, I think we need to incorporate more flexibility in the oil price forecasts the Commission does than either the Delphi method alone provides or that a biennial *Fuels Report* process provides.

We need more feedback from internal users of either the oil prices or the product prices that result about what's relevant in terms of scenarios, in terms of timing of the forecast's availability. And, again, what are impacts and what is the relevance of price volatility.

So that concludes my presentation. I'm open to any more questions.

COMMISSIONER MOORE: I have just one. On the last chart, which is summary of a lot of the others, --

MR. PAGE: I didn't know I had that one in there.

COMMISSIONER MOORE: -- what caused it to flatten out? If you're in year 14 plus, what caused it to flatten out?

MR. PAGE: That was arbitrary. As I say, when I tried to judge from the model results, what was a reasonable

limit to how far a scenario could go, and I looked at about how long most or some of these model runs might take to get you to that point, that's basically where I cut it off, but it was arbitrary.

COMMISSIONER MOORE: Okay. So no stock market behavior here. We're not seeing price-takers at some point that then begin to bid it back up?

MR. PAGE: Well, but that was part of what I considered. When I applied my own judgment to a model's result, I admit I'm bringing some biases into this, that this is, in fact, a negative-feedback system now.

PRESIDING COMMISSIONER SHARPLESS: Yes. On volatility, the way I understood it when I read what you had written, I thought it was pretty fascinating, that volatility is good, because basically it allows flexibility in the system, that allows for this stable equilibrium. Sorry. I don't know what other word to use beyond stable, but some kind of mid-equilibrium.

And so when ended your presentation with flexibility and the timing issue, it started me to thinking about whether or not you were suggesting to the Committee that we ought to be looking and trying to figure out what we could do in the area of the more near-term forecasting and the implications of the price volatility, because it might have a larger impact on the policies that this institution would follow than, say, with the

longer term.

Is that the point you were trying to make?

MR. PAGE: Well, that's one of the points. In a sense, it depends on the need and the use to which any price forecast is put.

PRESIDING COMMISSIONER SHARPLESS: And you're just throwing that up, what is the need, right?

MR. PAGE: Yes, what is the need. Yes.

PRESIDING COMMISSIONER SHARPLESS: Ask the end-users what might be the need.

MR. PAGE: Correct, correct. Absolutely.

PRESIDING COMMISSIONER SHARPLESS: Well, since in our strategic planning we've focused on, I think, both the long-term and the near-term, and we've done less of the near-term in some of these areas of forecasting, that is certainly something I think that the body and this Committee specifically is open to.

I just don't know where it would lead us, quite frankly, and what the implications of trying to design policies on near-term volatility might actually have on the long term, since you're saying volatility is good for a long-term stable price.

MR. PAGE: Well, that is a concern.

PRESIDING COMMISSIONER SHARPLESS: Stay out of the way, get out of their face.

MR. PAGE: In a sense, that's part of the message, yes.

PRESIDING COMMISSIONER SHARPLESS: Tell people volatility is good.

MR. PAGE: Right.

PRESIDING COMMISSIONER SHARPLESS: Good for you.

Okay. I don't have, I think, any questions more at this point about this testimony, other than to just loop back again one time and try to clear up in my own mind. You used sort of a combination of historical trends, Delphi Survey and your own take-off on possible scenarios?

MR. PAGE: Yes. It was, in truth, a mongrolized method.

And it's been an uncertainty for me. Approaching the problem this way, without a clear choice of method, is kind of awkward at times. But I think it was the only way I could struggle through the problem and get away from what I perceived to be the weaknesses of each method as I went.

PRESIDING COMMISSIONER SHARPLESS: Thank you.

So we have Mr. Kraples; is that correct?

If you'd like to come up to the table and have a seat, identify yourself and your affiliation.

MR. KRAPLES: Thank you, Madame Chairman.

I am Edward Kraples. I am the Director of the Financial Energy Markets Division of Energy Security Analysis,

Inc.

ESAI is a market research firm that has been in business for about 15 years. We're a group of 20 people with offices in Washington and in Boston. And we provide energy market views for both oil and gas and for electricity to about 100 entities worldwide, including oil companies and government agencies.

We also conduct special studies occasionally for our clients. And our research agenda for the fall of this year includes a re-examination of the energy security issue for the Japanese government, which will be an interesting exercise, and an analysis for the Maine Public Utilities Commission of the cost and benefits of a 30-percent set-aside for renewables in the electricity market there.

PRESIDING COMMISSIONER SHARPLESS: This is the state of Maine?

MR. KRAPLES: Yes.

So we do a wide variety of things, but they all center around this need for having a market view in energy.

I thought that Jim's testimony was very thoughtful, and it actually provides a nice framework for mine, because in my company we ban scenarios, since so many people do them, and it's so interesting to have so many available.

We have done the research that we have done for the objective really of providing a short-, medium- and long-term

view, a single one, and make the judgments that we make and then try to persuade our clients that we're right. So rather than give you five or six, I'm going to give you one.

And our market view is very simple. We believe prices, long-term energy prices, are mean reverting. They revert to, roughly speaking, the $20 price that Jim talked about. And we think the long-term market outlook is for the same. The basic reasons he's covered, I think, very eloquently.

I thought he did a terrific job in explaining the pressures that keep prices in -- I'll call it -- an unstable equilibrium, a very volatile equilibrium, but an equilibrium nonetheless. That, even though prices for energy may shoot up for one or two or even three years, in time we believe that the elasticities of both demand and supply in energy do, indeed, cause the prices long-term to be mean reverting.

And to argue anything less I think is very difficult because we really do have about a hundred years of evidence that this is how energy prices are formed.

In that context, then, the purpose, in our view, of an analysis of the energy markets is to try to help our clients anticipate the short-term and medium-term volatilities, and help them try to manage them with the array of instruments that deregulation has created for them.

In the past, as you know better than I, regulation provided risk management mechanisms for people so they didn't

have to go out and get their own. With the end of regulation in oil, then in gas and now in electricity, there has been an incredible proliferation of energy risk-management instruments that we believe today constitute a market of about, let's say, $100 billion of outstanding instruments in energy, in a world market for derivatives of all sorts, including interest rates and currencies, let's say 40 or $50 trillion.

So you can see that the energy slice at the moment is a very, very little one of the total energy derivatives' picture. But with the continued deregulation of gas and electricity, first in this country and then secondly in Asia and Europe as well, we think the electricity derivatives' market will mushroom and grow to trillion-dollar proportions.

Now the point of that is that it sustains and reinvigorates the process whereby energy prices are today largely made in the financial markets rather than in the physical markets, or they are made both in physical and in financial markets. And I will try to provide you with a framework for keeping track of how the financial markets determine energy prices.

So, in a nutshell, that's the purpose of my presentation today. I will focus most of my comments today on the physical side rather than on the paper side, but I will be more than happy to talk about the implications of this explosion in financial energy instruments.

Let's start with the global overview. Very similar to Jim's. World oil demand. And you will get a copy of this presentation. Let's focus really on the big picture rather than on the individual numbers.

Roughly speaking, world oil demand is growing at a rate of about one and a half million barrels per day, roughly speaking. That's about two percent per annum. We think that's a very strong trend.

If you decompose that global demand trend, about half of it is in the product area of metal distillates, that is diesel area, jet fuel and kerosene.

The diesel oil part of the world oil market is what you might call the very, very essence of the heart of that market. Diesel oil is the fuel of economic growth. Without diesel oil you can't move a truck from one place to another; you can't run small scale factories.

So when you look at the economic development of a country like Korea, you see a relationship in which diesel demand grows even faster than economic growth. And that happens for a significant period of time as the countries go from being underdeveloped to being developed.

So that part of world oil demand is incredibly robust. And governments do very little to discourage that. They really see the vitality of the diesel oil part of their energy markets.

A completely different policy picture obtains with

gasoline. When we look at global oil demand trends, gasoline accounts for only about a quarter of world oil demand growth each year. And there's a very simple reason for that, and Jim alluded to it: Gasoline is not essential to economic growth. It's a luxury fuel.

In most countries, I'd say, daresay, 95 percent of the developing countries, the very specific and explicit choice has been made to discourage gasoline consumption through, what you might call a European or Japanese style, taxes. There are very few countries that will follow the road of the United States, Canada and Australia, and allow gasoline to become a necessity.

And so, with that set of constraints, we believe that the contribution of gasoline remains fairly restricted. And in our firm we have never subscribed to the view that the world-on-wheels scenario connotes. We think governments simply will not allow that to happen.

And you can see in Europe and in Japan that it is possible to have a policy framework for the development of very advanced societies that does not rely, to the degree that we do, on putting two automobiles in every garage.

And so our view of the long-term oil demand outlook is for that to remain a restricted gasoline, one. And we would reject the world-on-wheels scenario as one that is interesting conceptually, but very unlikely to happen practically.

PRESIDING COMMISSIONER SHARPLESS: Excuse me. But

can't the world-on-wheels scenario include wheels that are driven by diesel fuel?

MR. KRAPLES: Yes. But when economies reach a certain level of maturity, the growth in diesel demand sort of abates. You only need to transport a given amount of material. And once you've reached the level of maturity of a Europe, for example, diesel demand actually begins to flatten out, unless governments make the explicit decision to encourage diesel consumption, as the French have done, by having diesel taxes significantly lower than gasoline taxes.

That's an anomaly. The local environmental consequences of really large-scale diesel use are sufficiently unattractive for people to go down that route. So --

PRESIDING COMMISSIONER SHARPLESS: But I guess the point I'm trying to make is how will people transport themselves in these developing countries. You're talking about services and goods, and I'm talking about the population at large.

MR. KRAPLES: In a country like Japan, tremendously greater reliance on mass transit than we have in this country.

PRESIDING COMMISSIONER SHARPLESS: And I've seen a growth in their transportation requirements, as well. Bigger cars, --

MR. KRAPLES: There is a trend --

PRESIDING COMMISSIONER SHARPLESS: -- more fuel consumption, just going the way of the West.

MR. KRAPLES: There is a trend in that. But if we were speaking 20 to 25 years from now, I think we'd also see that the trend has probably reversed, as the aging of the Japanese population actually presents less consumption of gasoline, less personal movement.

Don't get me wrong. If countries reach the levels of wealth that the Japanese have, there is a desire to buy a bigger car, a Lexus instead of a Toyota, to consume more fuel. But even taking that into account, the level of price, the $5 per gallon does put a significant constraint on how much the base load of gasoline consumption will be.

For example, in Japan gasoline consumption constitutes something like 25 percent of total oil demand. They have had four or five years of high gasoline demand growth, but no one I know in Japan thinks that that is something that is going to go on for another ten years.

PRESIDING COMMISSIONER SHARPLESS: Yes. But in Europe the passenger vehicles, most of them drive on diesel fuel. Is that not correct?

MR. KRAPLES: No. No, ma'am, that's not. There is a bigger diesel fleet than there is here, but the overwhelming majority of vehicles are gasoline powered, not diesel powered.

In France, about ten years ago the French government made an explicit decision to encourage the growth of the diesel fleet as a nontariff barrier to Japanese car penetration. The

Japanese don't make diesel cars. So the French government encouraged the diesel-fication of their fleet by keeping diesel prices low. And that made people like Peugeot and Mercedes have a leg up on the Japanese in competing for that market.

They have since decided to reverse that trend because of the polluting effects of diesel. So --

PRESIDING COMMISSIONER SHARPLESS: I didn't mean to, but on the scenario that talks about the world on wheels, I didn't think we were just talking about gasoline-driven vehicles. I thought that we have a combination of diesel, gasoline, a variety of possibilities that would allow that the wheels scenario, the world-on-wheels scenario, to keep growing.

MR. KRAPLES: Yes. And --

PRESIDING COMMISSIONER SHARPLESS: And, sort of like, well, how are you going to move people around? And mass transit is a wonderful idea. But if you're a large country and you're spread out all over the place, you're talking about a huge capital investment.

MR. KRAPLES: In a country like China you'd think, looking at the size of that country, that that would be a candidate for following the U.S. model for gasoline consumption. But the vast majority of the population in China in the, what you might call, the modern world that has money to buy cars, lives in the coastal cities.

And the master plan of the Chinese government is not to

build an interstate highway network that encourages the continued development of the automobile fleet but, in a way almost to retard that development by favoring investment in mass transit rather than in the development of an interstate highway system.

Don't get me wrong, the world-on-wheels scenario, to the degree that countries develop a mature and industrial or post-industrial economy there is, even in our more modest scenario for growth, even at 1.5 million barrels a day, there's room in there for a tremendous increase in diesel demand.

My point is that the increase is already in our numbers. It has already been taken into account. It's roughly a one-to-one ratio between economic growth and fuel growth in that segment of the market.

In the gasoline segment, the relationship between economic growth and gasoline growth is much lower than one-to-one for the reasons that I've mentioned.

So I don't disagree at all. There will be a very large increase in the demand for diesel. The majority of that will be industrial and not private transport.

I don't have at my fingertips the number on the percent of the private fleet that's dieseled worldwide, but I doubt it's more than ten percent. And no one I know thinks that's a number that's going to increase.

PRESIDING COMMISSIONER SHARPLESS: Thank you.

MR. KRAPLES: Breaking down this world oil demand growth number of 1.5 million barrels a day, I say roughly half of it is distillates, because there's a very fast-growing jet fuel element in there. About 25 percent of it is gasoline.

A small percentage of it, maybe five or ten percent, is residual fuel oil. It's an important and interesting product because it does continue to be an input to electricity generation. And it is useful to point out that on the East Coast of the United States and I think in Europe and Asia, as well, deregulation of electricity may reintroduce fuel oil into use as an electricity-generating fuel.

There was an active and strong policy push in the '80s to get fuel oil out of the electricity-generating business for supply security reasons. If you allow utilities to choose their own fuels, even though fuel oil is not competitive with combined-cycle natural gas plants, the fact remains that the fuel oil plants that do exist have some economic value as peaking plants and, frankly, as elements in your portfolio that you would like to have if you're a generator, like U.S. Gen, right, in case the natural gas price happens, for five years or so, to fly out of that zone of unstable equilibrium. So as a portfolio hedge, --

PRESIDING COMMISSIONER SHARPLESS: How do you deal with the environmental regulations aspect of that assumption?

MR. KRAPLES: That's obviously critical. The plants

that exist on the East Coast today typically are coastal plants. They're in compliance already, even under the tighter EPA rules that are proposed, that the siting of these particular facilities is such that most of the emissions go out to sea. So unless you're talking about global warming restrictions, the local environmental restrictions are not so onerous.

I know that's not the case here in California --

PRESIDING COMMISSIONER SHARPLESS: You mean a solution to pollution is dilution?

MR. KRAPLES: Something like that.

PRESIDING COMMISSIONER SHARPLESS: Not in California.

MR. KRAPLES: Not in California.

PRESIDING COMMISSIONER SHARPLESS: Winds blow the wrong way.

MR. KRAPLES: I completely understand that.

Worldwide, when you think about the composition of oil demand growth, the role of fuel oil continues to be an important one because electricity demand growth is very high. And fuel oil, even though everybody wants to go to gas, there are resource restrictions on how quickly gas can be put into power plants. So fuel oil continues to have a significant role to play.

The rest of the oil growth is taken up by products like naptha for petro chemicals and liquified petroleum gas, and so

forth. So that one-and-a-half-million-barrel-per-day number is from, let's say, a long-term planning perspective, we think a good one to use.

Then that leads to the question: What about supply? Will supply grow fast enough to provide this demand?

And our answer is yes. I think the key issue for petroleum companies for a hundred years has been containing the surplus in petroleum, not dealing with shortages. The anomalies were the '70s when, for reasons already mentioned, we had a perception of shortage. But I think it has become, at least in my community, the prevailing wisdom, with all of the dangers that prevailing wisdom has in it, that there is more than enough oil in the world to meet the demand for the next hundred years.

If we had a map in front of us and we could have a pinprick for every well that's been drilled in each country in the world, we'd cave in the U.S. part of it because we've had so many wells drilled here. But outside the United States, a few places in Russia, a few places in Canada, a few places in the North Sea, outside of those regions you would have very few pinpricks in that map.

And we continue to see the industry moving into new areas and finding large, large fields of oil on a routine basis. The political framework surrounding petroleum exploration has changed so fundamentally, in favor of the industry, that governments are literally falling over each other to welcome

companies in to look for oil.

And so in the past few years there has been no difficulty in replacing the oil that we've used. And when you hear the phrase, "We have 15 years worth of reserves," you know, of course, that that is an inventory number and not a reserves number.

The industry maintains an inventory of 15 to 20 years worth of reserves. There's no reason to have an inventory of 50 years. It's a waste of capital and resources.

So I've brought you an article written by my colleague at ESA in the *Harvard International Review*. It's a very useful review of the whole resource scarcity issue. My colleague's name is Sarah Emerson, and the title of her piece is "Resource Plenty, Why Fears of an Oil Crisis are Misinformed." I will leave this with you, but there is actually a nice pro and con on that point of view in this issue.

So our view is we have a tremendous amount of supply onhand. And, Tom, we have a few charts to run through. Why don't we do the next couple of charts?

I did want to briefly review the Russian oil picture, because on the demand side, the contribution of the former Soviet Union is an important one. Tom, go back to the one before, the slide before.

When you look at this history of oil demand growth over the last few years, it's a little difficult to read there, but

you are, I'm sure, very familiar with the decline and demand in the former Soviet Union. It was 4.6 million barrels a day in 1995. It was much higher than that in 1990. Their oil economy has basically imploded. It is now fairly evident that that decline has stopped. So we're now leveling off at about 4.2 million barrels a day.

At the same time that the decline has leveled off, you see, underneath the former USSR, the People's Republic of China. There are growth and demand is about 200,- to 300,000 barrels a day. I'll get back to China in just a little bit when I talk about Asia in more detail.

But these two sort of pivotal countries have, especially the former USSR, have sort of obscured the robustness of global oil demand growth in the last five years.

In the early '90s the decline of the Soviet Union's demand was so great that it looked like world oil demand was only growing by 3- or 400,000 barrels a day. That era is more or less behind us. And with some modest growth in Russian oil demand, growth that is contained by the difficulties that they're going to have in achieving real economic growth over the next five years, the underlying global growth of about 1.5 million barrels per day is something that we have a lot of confidence in.

We don't believe in a significant resurgence in Russian oil demand. That is part of our story.

PRESIDING COMMISSIONER SHARPLESS: And that's based on what?

MR. KRAPLES: It's based on the fact that there's going to be probably five years of restructuring the Russian energy economy along economic lines.

In the old days the Russians invested an enormous amount of their petroleum in the gasoline and auto fleets. Under the new rules of the Engagement in Russia, the number of cars being driven by Russians has diminished radically.

It's almost as if they had artificially created an automobile U.S.-style economy, automobile economy on a developing country. With the restructuring of the Russian economy, automobiles are going to be something that only the wealthiest people can afford.

So what we're going to see is we're going to see gasoline consumption continue to decline and the consumption of industrial fuels increase as the Russian economy begins to develop a real industry that is competitive in the world markets. So, in that sense, the Russian petroleum economy changes its appearance from a U.S.-style gasoline dominated one to a German-style diesel dominated one.

Another reason why Russian oil demand is going to be flat or grow very modestly is that the fuel oil component, which had been a very, very large part of electricity generation, that will be displaced by natural gas. They have plenty of natural

gas. It's very cheap, and it is a very quick and easy fix to some of the environmental problems that they have. So with no fuel oil demand growth and with a falling gasoline demand growth, all the growth in Russian oil will be in diesel.

I find that very persuasive. And it fits all of the facts that we have about Russian consumption changes in the past couple of years.

All right. I want to go to the supply slides. The oil supply story this year is the story of increases in both OPEC and nonOPEC production. The nonOPEC production numbers are -- in this slide, 1997 over 1996, the increase is about 1.4 million in nonOPEC production.

Remember I said that the increase in demand is about 1.5 million. So you see that, even without OPEC, the nonOPEC countries are increasing production enough to meet world oil demand growth. That's one of the reasons the prices have been so soft this year.

Looking ahead --

PRESIDING COMMISSIONER SHARPLESS: Could I ask you: Countries that are normally part of OPEC, but are not following OPEC direction, what category do you put them in? Somebody like Venezuela.

MR. KRAPLES: Yes. I put them in a category of notional OPEC members. I think the days of --

PRESIDING COMMISSIONER SHARPLESS: What did you

say, what was the word?

MR. KRAPLES: "Notional."

PRESIDING COMMISSIONER SHARPLESS: "Notional."

MR. KRAPLES: They're really not a part of OPEC any more. There is nothing, in my opinion, OPEC can do to bring Venezuela back into the fold. If OPEC were to try to impose some sort of sanctions on the Venezuelans, I think the Saudis know this, the Venezuelans would abandon OPEC.

Venezuela has crossed the Rubicon. They are now a part of the private petroleum industry.

PRESIDING COMMISSIONER SHARPLESS: So when we look at your charts, that is where we see Venezuela?

MR. KRAPLES: You will see Venezuela still in OPEC. And the very next chart will show you the contribution Venezuela is making this year to world oil demand.

The nonOPEC story is a very exciting one. I'm sure you've heard it before. It's a story of continued progress in different parts of the world. It's widespread and dispersed. You have very exciting developments in South America.

The bottom line is that this year and next year are years of significant increases in nonOPEC supply. The figure for next year is two million barrels per day. And one of the reasons for our fairly bearish price forecast for the next year or so is that we're wondering where all this oil is going to go. We have so much coming from Colombia, so much coming from the

North Sea, that the increase in nonOPEC production will significantly exceed demand growth. And I think that's a very critical fact.

The next slide, Tom, shows the OPEC --

PRESIDING COMMISSIONER SHARPLESS: Does that create a problem in and of itself?

MR. KRAPLES: Well, it creates that volatility that Jim talked about. We're expecting prices for WTI next year in the spring to be as low as $16 for periods of time. They may even go below that for short periods of time. So it is part of the commodity supply-and-demand cycle that is so critical.

And the message I think for the Commission is, when you see these kinds of dips, to not extrapolate them as people tended to do in these Delphi Surveys, not to extrapolate them, but to keep remembering that the mean is around 18 or $19 for WTI. And in our view it will go back to that mean.

The OPEC supply increased this year. Of course, you have Iraq; you have Venezuela. When you look out five years or so and you ask yourself, 'Should we be bullish on oil prices,' please remember that Iraq once upon a time produced three million barrels of oil per day.

And the very first phrase I heard from someone about the Middle East when I entered the industry is, "Baghdad sits on a lake of oil." It is a research rich country that could easily produce five or six million barrels per day, under a different

regime than is governing it now. So, again, Iraq is part of the resource-plenty argument that we've used.

Venezuela, we've already talked about. It has increased its production by 400,000 barrels a day. It's an egregious violator of OPEC quotas. And OPEC showed us at its meeting in June that they haven't a clue what to do about it.

So you will not hear me talk much about OPEC in our view of the future. We think it is an organization whose time has come and gone. That doesn't mean there's no security problem. It's just not denominated by OPEC. It's denominated by different things.

Critical for the U.S., in terms of our traditional paradigms for thinking about energy security, one of the critical elements of this change in the production profile of the world is that within a year or two the United States will be very close to independent of the Middle East. We will not need any Middle Eastern oil, because the Latin American oil and the North Sea and the West African oil will be closer.

We will probably continue to get some Middle East oil through the channels of the Saudi-direct investment in our refining system. So they made that investment years ago, perhaps thinking that this day might come. So we might continue to receive a million or a million and a half barrels a day from Saudi Arabia, but it's really not economic. In my opinion, they should be selling that to Asia.

So what is our security problem when we are not receiving Middle Eastern oil any more? Well, our security problem is that the world requires Middle Eastern oil, and it may be disrupted for all of the traditional reasons that we've talked about.

There is no solution to those problems, from a security standpoint, other than the strategic petroleum reserve, which the federal government now acknowledges is our primary weapon for combatting supply disruptions.

You may recall that in 1990 we did not use the strategic petroleum reserve in August and September of that year, even though many people, including myself, testified before Congress that it should have been used.

It was ultimately used in January, by the time the horse had already gotten out of the barn. And in the wake of that event I think the Washington policy community is now united on the view that an early use of the strategic reserves is probably the best weapon for combatting what we're really worried about which is not a supply problem but a price problem.

And most of my time these days is spent with oil traders. If a disruption occurs, like a 1990 disruption, and the federal government says, "All right. Our first step is to draw down two million barrels per day from the strategic reserve," and the Japanese are also going to draw down their stockpile, those traders will think more carefully about bidding

the price of oil up because they will be doing the math.

They'll say, "Well, we've got two million barrels a day drawdown. We have six hundred million barrels in the pot. We could do this for a year. Should I really be going long, *i.e.*, banking or betting on the price going up too much?" So I think a quick drawdown of the SPR, especially if it's accompanied by drawdowns elsewhere, is probably the best weapon that we have to combat short-lived security or supply disruptions.

Other than that, I think we really have no security program any more, because the international program that's on the books, the International Energy Agency's Supply Sharing Program, which was designed in 1974, frankly, won't work.

PRESIDING COMMISSIONER SHARPLESS: And that's because of?

MR. KRAPLES: Because it was designed in a system where the major oil companies control 80 percent of supply and could be dispatched to allocate supplies worldwide in a regulated basis. Today they only control ten percent of supply. And we're looking at a market where the trade is dominated by traders instead of by integrated oil companies.

So an allocation system like the IEA's, in its current configuration, will not work. I don't have a ready solution for that. I think most people recognize that it won't work, but negotiating a new agreement would be very, very difficult. And --

PRESIDING COMMISSIONER SHARPLESS: What about diversifying the transportation fuel system? What do you think the impact of that would have on security issues?

MR. KRAPLES: As a crisis-management response, it doesn't do much. As a --

PRESIDING COMMISSIONER SHARPLESS: No. You couldn't do it as crisis management.

MR. KRAPLES: That's a damage --

PRESIDING COMMISSIONER SHARPLESS: But just as a long-term policy.

MR. KRAPLES: Yes. I think that obviously would have a very, very beneficial impact. It would lower the cost of a disruption. We'd have to do a cost-benefit analysis to see if it beats building a bigger stockpile.

I was in federal government for a few years in the '70s when we did the Project Independence Report. And I worked on the analysis of the cost and benefits of stockpiling. And, frankly, I think stockpiling is by far the cheapest thing, compared to really major investments to limit our vulnerability, such as the one you're discussing.

It all depends on the frequency and severity of oil supply disruptions. Over the last 20 years we've learned that the disruptions occur quite frequently, but they're not very severe.

Now what is the probability of an extremely severe

supply disruption? What is the disruption that we're most worried about? And I have worked with government agencies to try to visualize what would justify the kind of investment you're talking about --

PRESIDING COMMISSIONER SHARPLESS: Well, if you looked at it from the standpoint that it would be economic in the long term, then you have a fuel that's competing with another type of fuel from two different fuel sources. And it's like a risk management tool.

MR. KRAPLES: Yes. It's a portfolio diversification.

PRESIDING COMMISSIONER SHARPLESS: Right. And I think oftentimes the investments are done at different levels, --

MR. KRAPLES: Yes.

PRESIDING COMMISSIONER SHARPLESS: -- so it takes so much more to get a new fuel into a dominate system, --

MR. KRAPLES: Agreed.

PRESIDING COMMISSIONER SHARPLESS: -- a newer technology, and acceptance, that it never ever pencils out. But if it's a good policy, in the long run, it's worth something to consider, I think.

MR. KRAPLES: I totally agree. Really it's the best argument. There is really a portfolio diversification. As long as the competing fuel is not extremely expensive in relation to the dominant fuel which we have just said our view is that it's

price is flat in the long term.

This is obviously the issue that we're involved with in the study we're doing for the state of Maine. How much should you pay to maintain the renewables in your state. It's a tough question. But if it's 50 percent more expensive than the base-load fuel, is that portfolio investment diversification, is it worth it. And that's really an analysis and a policy judgment at the end of the day that has to be made by the PUC. It's a tough call.

PRESIDING COMMISSIONER SHARPLESS: Their PUC.

MR. KRAPLES: Their PUC.

PRESIDING COMMISSIONER SHARPLESS: Right.

MR. KRAPLES: Their PUC.

So that gets me to the question of oil prices. Obviously, with the view that we had, that supply is plentiful, we have a view that prices are flat, mean reverting. But within that view we do expect price volatility on the order of 20- to 25-percent volatility measurement. That's really two standard deviations around that mean.

And I want to give you a framework for thinking about oil price formation in the short term. And this chart is half of that framework.

In our short-term market advisories we send to our clients, we take the view that roughly half of the price pressure comes from the paper market and roughly half of it

comes from the physical market.

And the physical market, this chart really shows you the comings and goings, if you will, of physical pressures on oil prices. This is a crude oil balance. This is a very different approach from the one used by CERI and the International Energy Agency.

We measure world oil demand in terms of crude oil demand as refinery through-put. We have built a database over the years of every country's monthly refinery consumption of crude oil. And it is that refinery consumption of crude oil that moves the physical pressure on crude oil prices.

So in this chart the bars are crude oil demand globally measured as by simply adding up the refinery through-put figures for all the countries in the world. We've invested an enormous amount of money to try to put this database together. And it's a pretty good number these days.

The supply number is the red area behind the bars. And you can see how seasonal the demand picture is. It's really striking that crude oil is a much more seasonal fuel than many people often think it is.

Right now, if you look at specifically where are we, in 1997 those bars in the middle there show you that worldwide crude oil demand, run by the summer requirement for gasoline, is quite high and actually exceeds supply by a little bit. And we're just at the edge of a short period in which supply will

exceed demand.

In a way that is more tedious than I need to describe here, we try to measure these things as precisely as possible and send advisories to our clients about price pressures. We do see a pretty good correlation between these cycles, if you will, of surpluses and deficits in crude oil, and price. Pretty good, not great.

PRESIDING COMMISSIONER SHARPLESS: Right. Is there partially an explanation of lag?

MR. KRAPLES: There is.

PRESIDING COMMISSIONER SHARPLESS: And then if you're seeing these high refinery demands, supply is coming in to meet those demands, and it reaches there, just as the demand is going down.

MR. KRAPLES: Yes.

PRESIDING COMMISSIONER SHARPLESS: Is there some explanation along that line?

MR. KRAPLES: Yes, ma'am. You are one of the very few people who have picked up on this when they first see the chart. Absolutely right. There is one to --

PRESIDING COMMISSIONER SHARPLESS: Well, I think we've lived through it here in California on a day-to-day basis.

MR. KRAPLES: You have. You absolutely have.

There is, in the Pacific Basin, there is a lag of about two months between the need to have the oil in the tank to

refine it and when you buy it. In the Atlantic Basin it's only about a month.

PRESIDING COMMISSIONER SHARPLESS: I want to ask you a question that's just sort of been nagging at me. To what extent do you think the information revolution is going to have an impact on the energy market? Some of it's this, just a more sophisticated information system that begins to almost have a moment-to-moment response period. People having more information on which to make different types of decisions and people using telecommunication in place of transportation.

Have you figured out how to factor those future events or current events into your calculations?

MR. KRAPLES: Directionally I completely agree with you; it is transforming the industry. In the paper market the information flow is instantaneous, so much so that in my company we are now having to maintain a Web page in which we constantly have to maintain a view, a statistical view, on what's going on.

Now in the physical world it remains a problem that we do not, for example, know the level of oil inventories in China. And there are times this year when a Chinese trading company called Hin Leong has probably caused your distillate price to be a nickel a gallon higher than it should have been.

So in the Asian market there is still a very imperfect physical reporting system. It's extremely frustrating.

The government of Singapore has been obtuse to a fault

in releasing vitally important inventory information to the world at large.

PRESIDING COMMISSIONER SHARPLESS: Well, they probably see that as a security issue, don't they?

MR. KRAPLES: Yes, they do. But I think they also wanted to have a vibrant futures market for fuel oil in Singapore, and that market failed. We told them seven or eight years ago that they had to release inventory data for that market to work, just as we release inventory data here. Traders need information to trade on.

The Singapore government refused to do so. And, as a result, the Singapore market has remained a club of a few dominant traders, many of whom are market manipulators. The latest one of those is Hin Leong, which is a Chinese trading company that bought 50 million barrels of distillate, squeezed the market and affected the entire Asia Pacific's energy costs. It's outrageous. It should not be.

So the information revolution can be stalled and is stalled by governments like Singapore and China that refuse to release timely information. Even Saudi Arabia, I think, is guilty of this. So that's very frustrating to people like us, who would like to make this chart be perfect. But there's a lot of guesswork in this, still, to this day.

On the paper side, however, it is absolutely incredible how much information flows to the trading community that trades

on paper ten times more oil every day than is traded in the physical market. And so that really is a good segue into the paper market side of my description of price pressures.

In the financial community, the role of speculators in commodity markets is well known and recognized. It's quite interesting to me to hear the Prime Minister of Malaysia accuse George Soros of bringing the value of his currency down. He may be wrong in the specifics, but he's not wrong in the general trend of the influence of financial trading on the price of oil.

And we monitor this. This is a whole different discussion. I did not actually bring our paper market presentation slides because I didn't think that was of interest.

We have studied WTI price correlations for 15 years. We have correlated WTI against everything in the physical market: Inventories, production, demand, everything. And we have never found anything that correlates as well with WTI price movements as the positions of hedge funds in the paper markets for WTI. It's absolutely fascinating.

The rules of the U.S. Commodity Futures Trading Commission that governs futures market require that brokers operating in each commodity market report the positions of their customers on the basis of three different categories: Commercial operators, noncommercial operators and small traders.

I'm simplifying here. But for the sake of discussion let's say commercial operators are the oil companies and the

consumers. They're hedgers. The noncommercials are, largely speaking, the hedge funds, such as the one that George Soros uses.

So, as a result of this requirement, we get every two weeks an update on whether the hedge funds are long WTI or short WTI. If they're long WTI, that means they are betting on the price to go up, and they are largely supporting the price. When they go short WTI they are betting on the price will go down. They're agreeing to sell WTI.

When you look at the dynamics of their buying and selling, going long, going short on this commodity, there's a marvelous correlation. When the funds decide to buy WTI and, if it's a big enough move, they will push the price of spot WTI up by several dollars. When they decide to sell WTI, they will contribute to a decline in the price of WTI.

You may remember in February --

PRESIDING COMMISSIONER SHARPLESS: What is the time period on this? Is this like an hour-by-hour?

MR. KRAPLES: Well, the data exists on a daily basis, but it is only published on a weekly basis. And it is published every two weeks by the CFTC. In its wisdom they don't want us to have more information than that.

Last February -- you may remember we had a long bull market in 1996. That bull market, at least half of the reason for that bull market's existence, in my view, was that the funds

were on a sustained program of buying commodities, not just oil but all commodities, as an inflation hedge.

In February of 1996 for some reason the funds decided to get out of oil. And they liquidated a very big net long position that they had. In rough terms, they sold about a hundred million barrels of oil in about two weeks. That's a huge change in the supply-and-demand balance of the paper market.

And, when they did that, the price of oil fell by 2 or $3. And suddenly we were back in the mean reverting world that Jim talked about. And I do believe that the analysts of the paper oil market don't care about this, don't study this. Ninety percent of that buying and selling of oil is done on the basis of technical charts that has absolutely no interest in the physical market.

Every fund has its own proprietary chart, so we don't know what they're using as inputs. But it is, largely speaking, it is an analysis of historic price relationships. And so, largely speaking, there is a self-fulfilling kind of prophecy in these charts that makes the funds sell oil when the bull market has gone on for three or four months. Then there's certain indicators who come along. The rally is exhausted. You hear exactly the same kind of terms used in the analysis of the stock market, the technical analysis of any individual stock.

PRESIDING COMMISSIONER SHARPLESS: But what you're

actually saying really goes to support what Mr. Page's basic theory is based on, I think.

MR. KRAPLES: Yes, yes.

PRESIDING COMMISSIONER SHARPLESS: What you're doing is you're making me feel more comfortable in what Staff has suggested the Committee ought to consider as a methodology for determining our 20-year forecast for this report.

MR. KRAPLES: Yes. I think if you can admit into that that volatility is largely driven by the paper markets, and that when you have --

PRESIDING COMMISSIONER SHARPLESS: Yes. When you say that, then what I instantly leap to is that there's not much one should or could do to deal with the day-to-day or week-to-week volatility.

MR. KRAPLES: Yes, ma'am. And we're in a different regulatory realm, as well. I think it's important to understand the CFTC regulations on energy trading, for example.

You may recall that last November Hazel O'Leary, the Energy Secretary, was concerned about the price of distillates and called the CEOs of a number of companies in to her office to talk about what might be done.

The concern was that the heating oil stocks had not risen enough. And the essential reason that happened is that oil prices, diesel oil prices, were never in Contango in the summer of 1996. Oil prices used Contango to fund stock

building. So the stocks were too low.

And one of the CEOs -- this was reported in the press, so I can talk about it -- Mr. Leon Hess, who's one of our clients, said to her, "You really -- rather than punish us for not building enough stocks, why don't you regulate the speculators more aggressively by increasing the margin requirements on their investment." And --

PRESIDING COMMISSIONER SHARPLESS: What was her reaction?

MR. KRAPLES: Her reaction was --

PRESIDING COMMISSIONER SHARPLESS: Good idea.

MR. KRAPLES: Her reaction was, "What's a margin requirement?"

(Laughter.)

MR. KRAPLES: And, no, actually what happened is that Mr. Hess had an impact. A study has been launched -- I'm an advisor on that study -- on the relationship between the positions of hedge funds and the price of oil. And that study is ongoing, as we speak.

COMMISSIONER MOORE: Can we go there for just a second then, --

MR. KRAPLES: Sure.

COMMISSIONER MOORE: -- since it's ongoing.

If we've got a long-term line that has got some fluctuation in it that's driven by speculative buyers or maybe a

derivatives market, a second-order derived market, isn't that market back-checking itself somehow?

In other words, if it's going on for three, four months at a time, and then you say the run-up might be exhausted at that point, isn't it literally doing some sort of a back-cast and saying, 'Well, we missed the mark,' and then it adjusts a little bit. So it's not just a paper market that's totally divorced from the physical market, but it's just taking a longer periodic check-back?

MR. KRAPLES: Yes, absolutely.

I think the understanding of the interactions between the physical and the paper markets is really the state of the art in oil market analysis these days. I'm not going to say that we have the way of linking those two, but we do try to link those two.

The physical market's price pressures are, on the one hand, taken from the paper markets, right? But, on the other hand, they can dominate and ultimately destroy a paper market trend if the paper markets misperceive the reality of physical supply and demand.

I'll give you a very concrete example. Next spring we're envisioning a very big increase in world oil supply, bigger than demand. We know that the funds are not going to be reading our material. They're not going to be looking at physical market -- the only thing the funds look at might be the

API stock reports. Other than that they're nonanalytical from a physical market standpoint.

So their charts, whatever they are, and there's thousands of them, their charts will be doing that analysis, that back-casting. They'll be looking at the momentum of a particular bull market. They may be looking at the relationship between the WTI price and the gasoline and heating oil prices. For God's sakes, they may be looking at the relationship between WTI and soybeans, because, believe it or not, that's the strongest correlation there is in the oil price. It's weird.

COMMISSIONER MOORE: Yes.

MR. KRAPLES: Whatever it is, let's say that we're right and the physical market becomes over supplied, what's the mechanism for conveying that information? It's mechanisms like this, it's the WTI-Brent price relationship.

Brent is a world maker just like WTI that reflects physical market forces better because WTI is the chosen vehicle of the world financial community, right? So Brent prices would start to fall. The WTI-Brent spread opens to a buck fifty. People like us say, "Hey, wait, wait. This is very high." Some of the charts may pick this up, right?

Inventory data are not leading indicators; they're lagging indicators. So by the time the inventory numbers really, in the U.S., really start to show a big increase in supply, it'll probably be three months after the physical

reality has already occurred in the oil market in the form of ships that go without being sold, tankers laden without customers.

So really, in that case, you need to be so deep inside the industry to pick up a leading indicator like this, that the published information, what I'll call the traditional published information, won't do you any good.

It becomes a networky thing. You'll see Internet sites --

PRESIDING COMMISSIONER SHARPLESS: One of the question I had, Michal, was the impact of the information revolution on getting these points of information closer together so that you wouldn't see lags. This is the physical side. And on the paper side he's saying that basically, in most cases, you get more --

MR. KRAPLES: In most cases.

PRESIDING COMMISSIONER SHARPLESS: In most cases. But there are some important cases that you don't get information.

MR. KRAPLES: Yes, that's right. So there really is no hundred-percent reliable or even eighty- or seventy-percent reliable source. It is a constant matter of judgment and analysis. So the paper markets, the funds have been severely punished a couple of times by either not looking at the physical market enough or by misperceiving something like an Iraqi move.

You know, a couple of times they misperceived what the Iraqis were doing, and they went long and they should have gone short, and they got severely punished.

Nevertheless, I'd say more often than not the funds do seem to lead the market.

COMMISSIONER MOORE: Well, you know, we've been discussing this as if it were possible to get that line with such a tight fit that it was just vanishingly small. And even though it's perhaps a contentious topic, economists have a term that they use for unemployment, "structural unemployment," a residual that you simply can't get away from. It's inherent given the turnover times and the nature of the demographic pool. You just can't get away from it.

Some people have argued that it was as high as six and a half or seven percent, and that that was the reason you could never get unemployment rates down below that.

Is there potentially some structural information gap that you simply can't overcome. If it's a lag time of 90 days or something like that, then you figure the volatility that's associated with 90 days of wrong information, however wrong it can get, and/or it's 30 days, whatever that is. Is there a structural lag like that?

MR. KRAPLES: Yes, there is. And it used to be a lot bigger. You could even say five years ago it might have been as much as three or four or five months.

Now, let's say if you only relay on the International Energy Agency's monthly report, which is a marvelous piece of work, but it still has an information lag, I'd say, of three months.

If you are totally deep in the market, like we are, and you dedicate ten people to do nothing but study the market and listen to everything, you might cut that lag to 30 days, you still have physical market imperfections such as: What are the Saudis doing? What is their actual production number as opposed to what they release to the press? And how are the various members of the press competing with each other for news about Saudi production numbers? There's a lot of this sort of inside baseball stuff.

I think you can cut to as little as 30 days, but you've still got that 30 days there. And then you have variables like the weather. The wet weather comes in. You don't know what the weather is going to be.

COMMISSIONER MOORE: Sure. Or what's afloat that's under contract that's not spot.

MR. KRAPLES: There I think we can probably -- the information of people inside the game is probably pretty good. But the other area now, I'd say the next biggest after the weather, is what the funds going to do. Do you know what the funds are going to do? If you did know, if I did know I wouldn't be here, right?

COMMISSIONER MOORE: Sure. Well, let me take that one step further. It's a question I've been burning to ask someone, and you're probably the right actor to answer it. And that is: What's the effect on the funds of having a secondary market in derivatives that's trading in parallel to this? Has is that derivative market either driving or somehow reinforcing an influence on the primary fund market? What's happening with that?

MR. KRAPLES: Well, talk about information lags. That is a hugely important and difficult question to answer.

The fund trading on futures is marvelous because of the reporting transparency of their positions. Even though that transparency exists, there are still areas, even within that data set, that are difficult.

For example, Fibro is a trading house. It's also an investment bank, right? It's a part of Solomon Brothers. Would you classify it as a speculator, or would you classify it as a nonspeculator, a hedger? Some of its positions are hedging positions; some of them are speculative positions. So there are imperfections in the data even within the subset of derivatives called futures.

The subset of derivatives called futures, in our view, is probably 20 percent of the total set called derivatives. So 80 percent of energy trade is over the counter. And the forces that we're talking about probably affect the derivatives markets

in a similar way that they affect the futures market.

But here's the key: The futures market is the price index. All the deals done under derivatives markets are based on WTI as traded in the Nymex, or heating oil is traded in the Nymex, or there's a flat price, reporting benchmarks and things like that.

So at the end of the day I think we can rely on the futures price indexes and the analysis of fund behavior in futures to a greater extent.

Unfortunately, they don't do this in Europe so you can't do it for Brent. And, unfortunately, you can't do that here, right, because your market is completely untransparent, and you have no futures. You have a fairly small derivatives market.

PRESIDING COMMISSIONER SHARPLESS: Yes.

MR. KRAPLES: So in what you might call the dominant WTI market, I'd say, because WTI futures is the index for everybody in the world, the problem you're talking about is not as big as it would be if you didn't have a WTI futures.

My worry about electricity is that we'll never have an electricity benchmark, right? Will Cobb be the benchmark; will Palos Verde be the benchmark? Maybe. It's very interesting that, after a year and a half, finally there is significant speculator involvement in the Palos Verde contract. We've been --

COMMISSIONER MOORE: I've been trying to plot those, just kind of going up on the 'Net and then pulling them down into a file every week just to sort of see what's happening with it.

MR. KRAPLES: Yes.

COMMISSIONER MOORE: But it may --

MR. KRAPLES: It looks like --

COMMISSIONER MOORE: If anything is going to turn out to be that benchmark, that's probably the one.

MR. KRAPLES: It's looks like the winner to us, too.

And the fact that the funds are finally in there is great, because it does give the market liquidity which you can't have without them. And that will attract more hedgers into it. Once we start an East Coast electricity contract, then we're really going to have, I think, just an explosion in this same process operating in electricity as we have in oil and gas.

PRESIDING COMMISSIONER SHARPLESS: Mr. Kraples, I'm looking at the time now a little bit.

MR. KRAPLES: Oh, sorry.

PRESIDING COMMISSIONER SHARPLESS: It's 25 after 12:00. We probably need to take a lunch break here pretty quick.

I would like to give you some opportunity to kind of wrap up.

MR. KRAPLES: Okay.

COMMISSIONER MOORE: And we could have him come back after lunch as well.

PRESIDING COMMISSIONER SHARPLESS: Yes, if you will.

MR. KRAPLES: Sure. I --

PRESIDING COMMISSIONER SHARPLESS: Does your schedule allow you?

MR. KRAPLES: I'm at your disposal.

PRESIDING COMMISSIONER SHARPLESS: Great.

MR. KRAPLES: My flight is not out of here till later tonight, so whatever you like.

PRESIDING COMMISSIONER SHARPLESS: Wonderful. We very much appreciate your comments, and there will probably be a dialogue later on in the day that would be helpful to have you participate. But if there's any summation you'd like to make at this point in time, it would probably be a good idea.

MR. KRAPLES: Okay. Shall I assume that, let's say, the rest of the canned presentation, we'll shelve for now? You have the slides. Or would you like me to continue with the canned presentation after lunch?

PRESIDING COMMISSIONER SHARPLESS: How much more presentation do you have?

MR. KRAPLES: We've gone through about half of it. But --

PRESIDING COMMISSIONER SHARPLESS: Oh, boy. Let's

do it after lunch. We'll try to restrain from asking you as many --

MR. KRAPLES: This is much more fun for me than having to do the canned presentation.

PRESIDING COMMISSIONER SHARPLESS: -- deviational questions here.

I also want to ask: I have Ken Despot from Bakersfield. Now that's quite a ways to drive.

Do you have a time constraint? Can you come back after lunch?

MR. DESPOT: I can come back after lunch.

PRESIDING COMMISSIONER SHARPLESS: Do you mind keeping your comments until after lunch?

MR. DESPOT: Yes, that will be fine.

PRESIDING COMMISSIONER SHARPLESS: Fine. Then we'll break, and we'll be back here at 1:30. Thanks.

(Luncheon recess taken from 12:25 to 1:38 p.m.)

PRESIDING COMMISSIONER SHARPLESS: Good afternoon. Hi.

MR. KRAPLES: Hi.

PRESIDING COMMISSIONER SHARPLESS: Well, we're anxious to hear this second half of your presentation, and sorry for the diversions this morning, but we'll try to...

MR. KRAPLES: Please. Let's have as many of those as possible.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. KRAPLES: It certainly makes it more, hopefully, more entertaining for everyone.

PRESIDING COMMISSIONER SHARPLESS: Well, if not entertaining, at least informative.

MR. KRAPLES: My mentor in this business was a man named Paul Frankel from London. And he always told me that the job of someone like me is to entertain as well as inform, so I think we're well advised to remember that --

PRESIDING COMMISSIONER SHARPLESS: Good.

MR. KRAPLES: -- when we give these presentations on dry topics.

Let's talk a little bit about refining and sort of finish up with a brief review of the Asian market and California's place in it, if that's okay?

PRESIDING COMMISSIONER SHARPLESS: Yes, please.

MR. KRAPLES: Okay. Our view on refining is economic rather than technical. So there are people in this room who know a lot more about how a refinery works than I do.

Amongst the analytical and informational services that we provide is we do keep up very carefully with additions to the world refining system. And the big story over the last few years has been the tremendous explosion in Asian capacity.

And that explosion has actually resulted in a reduction in the refining margins in Asia, which is quite surprising,

because I remember five years ago or so my very good friend Asian oil expert Fereidun Fesharaki, among others -- I think Cambridge Energy did this as well -- issued forecasts that were alarming about the refining crisis in Asia, forecasts that were way, way off the mark.

What you see on the chart now is our forecast of distillation capacity changes in the various regions in the world. And you see just how dominate the Asian influence is.

I think it's fair to characterize the refining industry as subject to the same surplus containment problem that the crude oil producing industry is. The refiner's problem is that the industry tends to overbuild. It's quite a cyclical business. And for some years now we've been in a downward cycle. And you've seen that in the refinery sales that have taken place in this state as well as others. That I think when Unocal sold their assets to Tosco it was something like ten cents on the dollar, an incredible bargain for refining capacity.

Refining margins in this state and in all parts of the United States are, at the end of the day, determined by global forces, not national forces. And in that vein the very big picture on refining as a business, in our view, is that this is probably the transition year from a period of declining margins to a period of increasing margins.

For the first time, almost in my company's ten-year

history, we're a little bit bullish on refining margins, which means for consumers just the opposite, we're bearish for price pressures; because, in fact, a very important change has taken place in the policy framework within which refining investments get made in Asia.

There are two countries in Asia, Korea and Japan, where refining capacity investments have tended to be made in anticipation of demand. That's certainly true for Korea. It's not quite right for Japan.

Let me focus that comment on Korea. Korea has made an enormous investment in refining capacity in anticipation of demand. And that can only be done in an environment in which the refining investment is protected by the government. And because Korea regulates its market in a way that guarantees refining profits for its companies, these companies have been very, very aggressive in expanding their capacity.

That is now changing.

PRESIDING COMMISSIONER SHARPLESS: Do they have a goal? Is it based on a goal?

MR. KRAPLES: Not really, no. I think the projections -- we have clients in Korea, and we've done work for the Korean government -- the projections in the mid-'90s were there would be double-digit growth for the indefinite future. Those projections I think were naive, but they were nevertheless driving the view that we need to continue to build refining

capacity --

PRESIDING COMMISSIONER SHARPLESS: But they never worry about when they might meet a point where it becomes --

MR. KRAPLES: Uneconomic?

PRESIDING COMMISSIONER SHARPLESS: -- uneconomic?

MR. KRAPLES: No, they did not. Not until really this year.

This year there's been a significant change in the Korean economic prospects. And for the first time we see a debate in Korea about making these investments in a more economic and less protected way, a less subsidized way.

And with that we do envision -- I won't go into the gory details of it -- we do envision a significant slowdown in this dynamic county's tendency to build in anticipation of demand. That means that the fast-growing countries in Asia, "fast-growing" in terms of oil demand, China and India, that their policy will now become the dominate one for the region. And they tend to build in reaction to demand, not in anticipation of it.

That means in China that they have what we call a stop-go policy of economic controls. They will let the economy and the oil demand growth go for a year or two. And suddenly the product imports come tumbling in in ways that the government finds alarming, and then they stop the whole process. And for a year or two they really keep the screws on the imports and they

expand capacity somewhere so that they don't have to import too much in the way of products.

So with that change in the Korean expansion and the continuation of this kind of stop-go process in China, we're looking at the Asian refining investments as you see in the year 2001 as beginning to slow down and beginning to meet the demand rather than exceed the demand in the region. I actually think that the numbers we have up there may turn out to be a little bit too ambitious.

And if Asia then becomes the region that is no longer building such a tremendous increase in capacity, rationalizations in North America and in Europe in refining will probably cause the utilization rate of global refining to rise from what is now the mid-seventy-percent range up into the eighties. And with that --

PRESIDING COMMISSIONER SHARPLESS: Can you explain that, the rationalization of --

MR. KRAPLES: Of refining capacity?

PRESIDING COMMISSIONER SHARPLESS: Right. Explain that for me.

MR. KRAPLES: In the United States in the past ten years we have shut down a significant number of uneconomic refineries. That process will continue. We think we'll lose a few more refineries in the next few years. Similarly in Europe, which is an ultra mature oil region, that simply has too much

capacity, some of which is being retired.

So we see things like the closing of refining, the merging of refining operations by people like Texaco and Shell as evidence of rationalization for economic purposes, and doing the best they can not to have a surplus of capacity.

PRESIDING COMMISSIONER SHARPLESS: Now what is that the implications on that globally again?

MR. KRAPLES: Globally we think the implications of that are to allow refineries to have higher margins in the future than they did in the past. Tom, a few slides further on, you'll see a chart on global --

PRESIDING COMMISSIONER SHARPLESS: But does that assume that we're going to be importing more refined product; is that what you're telling me?

MR. KRAPLES: No, ma'am. It doesn't really matter if you're importing the product or if it's being produced locally.

There's a refining margin chart of -- three or four slides further. It means that -- let's say the Singapore average refining margin, which has been declining for the last four or five years, will now begin to increase. Here's the chart.

The L.A. average refining margin, using L.A. prices as opposed to Singapore prices, will be influenced by that increase in the refining margin of Singapore. Singapore, in the last few years, if you see the chart there that says the Pacific, that's

the highest --

PRESIDING COMMISSIONER SHARPLESS: And can you explain why, does that have to do with the markets they are serving?

MR. KRAPLES: Yes. Singapore is, let's say, the Asian index for refining profitability. It's the free trade area of Asia. And it's really the only one that you could look at and say: What is the state of market-determined margins in Asia?

Remember that in Japan and Korea, China, Taiwan, the margins are still largely protected, and so you can't really talk about market-determined margins. They're regulated margins.

The Singapore margin is protected. If I had that chart going back, say, four or five more years into the past, you would see that it used to routinely, the Singapore one which is the top one, be up at the 7 and $8 level. And with the surplus in Asian capacity -- and I use that word "surplus" advisedly. It's really not a surplus. It's a construction of capacity in excess of the increase in demand -- with that trend, the refining margins in Singapore have tended to go down. And with that refining margins in other regions of also tended to go down. There has been a depression, if I could put it that way, in the refining industry over the last five years.

As we look ahead with the slowdown in Asian capacity,

with the retirement of uneconomic facilities in the United States -- and there's not a lot, but there's still a few -- and in Europe, with the merging of some operations, the consolidation of refining as a business in this country, which we do see in things like the Shell-Texaco merger, we believe that these charts that you've seen here represent a kind of a bottoming out of the refining cycle. In other words, from here, that refining margins will tend to go up.

Tom and I were discussing over lunch, if you wanted to be in the oil business, which would you rather be, a marketer or a refiner, I would say now I'd rather be a refiner looking ahead then a marketer, because I think marketing is going to be more and more and more competitive.

So the point about all of that is that refining margins are globally determined, one region influences the other. As I said earlier this morning, if Hin Leong executes a squeeze in the Singapore market for distillate, you feel it here in L.A. We can do studies and see what that price relationship is, but there definitely is a price relationship.

So part of what Tom asked me to talk about is what is the economic outlook for the oil industry and the refining industry in California in Path 5, I'd say it's pretty good, because the global pressures that have been on refining are abating and the global environment is better.

You have to add to that the peculiarities, of course,

of your California market, which you know better than I. So, by and large, I'd say the refining industry can look ahead to a brighter, rather than a more dismal margin outlook over the next four or five years.

PRESIDING COMMISSIONER SHARPLESS: But that doesn't necessarily mean new refineries?

MR. KRAPLES: No, no.

PRESIDING COMMISSIONER SHARPLESS: That means better margins of existing refineries?

MR. KRAPLES: Yes, exactly.

In the United States there's really only one new refining project that I'm familiar with, and it's really not a new one. It's the refurbishment of an old one in the Good Hope Refinery in Louisiana, which probably will not succeed in coming back to life.

There's no need, no reason for us to build additional capacity in this country. We are not growing fast enough to merit that. Moreover, there's probably enough offshore capacity to meet all of our needs into the indefinite future.

So almost every oil company I know that's in the refining business, except for Tosco, has been trying to get out of it. I think Tosco's acquisitions in the future will seem like just brilliant buying at the bottom of the cycle, which I think they have been brilliant, from a pure economic perspective.

PRESIDING COMMISSIONER SHARPLESS: That would make Unocal at the other end of the equation?

MR. KRAPLES: Yes, ma'am. Absolutely.

Now the final point I'd like to make about the refining is that the environmental requirements, especially in the Asian market, do continue to tighten. And we have sent the Commission a report on Asia's environmental requirements, which I'll summarize in one minute or less.

In Asia, gasoline is going to become a higher and higher quality, but there is no country other than Japan that aspires to CARB II specifications.

Diesel, everyone aspires to the ultra low sulfur diesel, and that market looks to us like it is tightening. And ultra low sulfur fuel oil for electricity generation may well be the most profitable product that a refiner can sell if he has access to it. So --

PRESIDING COMMISSIONER SHARPLESS: When you say that the low sulphur diesel worldwide is tightening, that implies what?

MR. KRAPLES: That implies --

PRESIDING COMMISSIONER SHARPLESS: That the sources are becoming more limited?

MR. KRAPLES: The demand is growing faster than the immediate capacity to supply. That's the best answer to that. Over the next five years --

PRESIDING COMMISSIONER SHARPLESS: So that implies investment?

MR. KRAPLES: There will be investment in desulfurization of distill- --

PRESIDING COMMISSIONER SHARPLESS: But it would take so many years to get there?

MR. KRAPLES: Yes.

And it's not a difficult investment to make. The investment will be made. But what you might think of as the differential between the price of super low sulfur diesel and regular diesel, that differential will stay quite strong as a motivator, really, for the investment to be made.

It will be made, in our view. It's inevitable because --

PRESIDING COMMISSIONER SHARPLESS: Is this being driven by environmental consideration?

MR. KRAPLES: Yes, ma'am. The environmental concerns, if you've been to Asia, you know just how urgent it is that countries like Thailand and China adopt stronger and more stringent environmental specifications.

And the book, the report that we've sent you, has our views on the schedule at which those investments will take place. So in the, say, next five years or so, the most sophisticated refineries, those capable of producing these products, will do especially well.

I envision, on the diesel side, countries perhaps adopting some of the specifications you have here, and perhaps the diesel market being one in which there is more trade between you and the rest of Asia than there is at present.

Finally, in Asia and globally in the refining business, there is a significant change in the climate of regulation. We set the world standard for deregulating the refining industry in the early 1980s. We were the first country to really significantly deregulate refining.

And that meant that we had to face a security question: Do we want to import crude oil or do we mind importing petroleum products. And the government essentially, the federal government, essentially said we don't mind importing finished products.

There were, in the olden days, people who said we needed to import only crude and we needed to protect our refineries. Well, that attitude of protecting refineries has been dominant in Asia.

In Japan and Korea and China there has been the attitude that we cannot rely on foreigners for products, so therefore we must have refining self-sufficiency. That's had a big impact on the Asian market trade flows. That's beginning to erode now.

As you probably know, the Japanese this year have finally dropped their export ban on petroleum products. A year

or so ago they dropped the ban on importing petroleum products. There still are some residual regulations, but within a few years they will be gone. So Japan will be a free market oil trading country just like the United States is.

And I think that does have some important implications for California. There are some Japanese refineries who may well decide they want to be able to trade with you and will aspire to create the kind of products that you need. It wouldn't surprise me at all.

So, I would think, for you that would be a good diversification of supply, even though the Japanese worry that if they become oil sellers to us, as well, it will exacerbate the balance-of-trade deficit.

I keep telling them not to worry about that. That that's not -- that the amount of oil they sell would not be sufficient to really change that number.

I think in terms of your planning, Japan and Korea as potential sources of petroleum products is in your future and could perhaps be a significant trend --

PRESIDING COMMISSIONER SHARPLESS: Can you put a timeframe on that?

MR. KRAPLES: I'd say within two years.

PRESIDING COMMISSIONER SHARPLESS: Two?

MR. KRAPLES: For Japan.

Within five years for Korea.

So to the degree that your petroleum product demand growth exceeds your capability to supply, I would say that the Asian market is evolving in such a way as to be a part of the solution to that problem. In the past it's been part of the problem because of the distortions and basic lack of trade in petroleum products in the region.

That leaves us just with a couple of concluding comments about Asia. You've probably read about the significant transformation and the economic prospects of Southeast Asia and of Korea. The popular wisdom about Asian oil demand was that it by itself could grow a million barrels per day per year. That was Fereidun's forecast fairly consistently in the '90s.

We think that's way too big. It's probably more like 6- or 700,000 barrels per day, that the economic growth hiccups that you're seeing in Asia now, in the long term, are a normal part. Asia has its product cycle, just like we have our economic cycle.

So that when you put all of that together, Asia's growth in petroleum demand is not so overwhelming as to tax the world's production. This is sort of going back to my comments of this morning.

I'm amazed at how often I read breathless pieces in the *Wall Street Journal* about how Asian oil demand is so big that it's going to overwhelm the capacity to supply. It neither overwhelms the crude capacity nor does it overwhelm the refining

capacity. To the contrary. Surplus containment is a bigger problem.

No matter what the Asian projections people have, at the end of the day, some -- you know, countries grow for a while and they retrench for a while. They grow and they retrench. They grow and they retrench.

So for planning purposes, a growth number for Asia of 6- to 700,000 barrels per day we think is very sustainable, in your terms, Jim, and very moderate and reasonable. And we would not accept significantly higher numbers because they're unreasonable.

The handouts that I've given you have very detailed country-by-country forecasts of Asian demand growth. I'm not going to review those with you now. But if you have any questions, we'd be more than happy to answer them.

I'll just conclude by saying that I think Asia is moving towards you in the quality specifications and in the deregulation. And so I do envision Path 5 becoming more a part of the Asian market. We know you're not a part of the U.S. market, so you will be a part of an Asian market that is going to develop its own rhythms in terms of paper markets, styles of risk management, bilateral and multilateral trade relationships, and industry connections.

Perhaps Tosco will buy some distressed Japanese refinery next year and start to optimize U.S.-Japan or

California-Japan energy trade.

So let me stop there and say any questions that you have, I'd be more than happy to address.

PRESIDING COMMISSIONER SHARPLESS: Jim.

MR. PAGE: Ed, just to reconcile your numbers here. On your Asian oil demand, I need just a quick calculation gives me about 900,000 per year, that these are your forecasts?

MR. KRAPLES: This is going how far into the future?

MR. PAGE: This is from '96 to 2005 on your table here. Your numbers, though, you were quoting were 600,- to 700,000?

MR. KRAPLES: Yes.

How do I reconcile those, too?

MR. PAGE: Yes.

MR. KRAPLES: In our shop we have people who do the forecasts. You know that SERA is a part of your Delphi technique. We have arguments within our company about what's sustainable and what's not. And at the moment I'll say that the bulls in our shop about Asia have got the number closer to 900,-. I think it should be closer to 600,-. So even internally we have differences of opinion about how high that number should be.

I think our China number right now is too high.

PRESIDING COMMISSIONER SHARPLESS: Any questions?

Well, I'd like to ask if there are any questions of

members of the audience who would like to come forward and ask this presenter any questions that they might have at this time?

MR. KRAPLES: I've exhausted them, I think.

PRESIDING COMMISSIONER SHARPLESS: Well, I want to thank you very much. And I hope you can stick around a little bit longer in case we loop back to some of the questions that you've raised.

MR. KRAPLES: I'd be happy to.

PRESIDING COMMISSIONER SHARPLESS: Thank you very much.

MR. KRAPLES: Thanks.

PRESIDING COMMISSIONER SHARPLESS: I believe we were going to go to the gentleman from Bakersfield, Ken Despot.

Could you give your name and your affiliation, please?

MR. DESPOT: Thank you very much, Madame Chairperson, and Members of the Fuels and Transportation Group of the California Energy Commission.

My name is Ken Despot. I am a research and development chemical engineer for Golden Bear Oil Specialties located in Oildale, California. And we're a specialties oil refinery located just north of Bakersfield, California.

What I'd like to do today is I have a short write-up here I'd like to present. It's about eight to ten minutes long. And afterwards I'd be very willing to try to field some questions.

1997 Fuels Report Hearing, August 21, 1997

Today I'm going to address the topic of premium diesel fuel and the possible effects that may have on the value of California's San Joaquin Valley crude and the availability and cost of diesel.

In January of 1993 the Engine Manufacturers Association, also known as EMA, requested that the American Petroleum Institute, API, look into the economics of EMA's proposal of raising the cetane number of highway diesel fuel from the current ASTM D9 75 level of 40 up to a new level of 55. The reasoning being that the increased cetane number would assist diesel engine manufacturers in complying with the 1998 NOx emission standards.

In July of 1993 API responded to the EMA that raising the cetane number was not as cost effective as modifying the engines to lower the NOx emissions.

The EMA then changed their tactics and developed what they are terming a consensus requirement for diesel reporting. This consensus requirement was drafted for input from refineries and other interested parties and holds no legal standing.

However, our concerns that the EMA may unilaterally impose this specification in order for warranty services to be honored.

Included in their consensus requirement, along with a myriad of other requirements, is a cetane number of 50 minimum and a cetane index of 45 minimum.

On another front, the National Conference on Weights and Measures, NCWM, was contacted in January of 1995 by the Southern Weights and Measures Association, SWMA, to arrive at meaningful definitions for regular diesel fuel and premium diesel fuel. The reason for the contact was to establish a definition for premium diesel fuel in that it had begin to proliferate in the Southeast and to provide consumer protection. In other words, to allow the consumer to examine what they were getting for their money when they purchased a "premium" diesel fuel.

Properties of diesel fuel were discussed, but a definition of "premium" diesel fuel had not been arrived at yet.

In June of this year a Joint Task Force from the ASTM Diesel Fuel Specifications Committee, Section (a)(2), and the National Conference on Weights and Measures met in Philadelphia, Pennsylvania at an ASTM meeting for the purpose of defining a premium diesel fuel.

The purpose of the definition was to define exactly what parameters to use and what values to set for these parameters for a definition of premium diesel. Besides a cetane number, other parameters mentioned by the Joint Task Force were detergency, low temperature properties, --

PRESIDING COMMISSIONER SHARPLESS: Excuse me, what was that word?

MR. DESPOT: Detergency.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. DESPOT: -- low temperature properties, heat content, oxidation stability and lubricity.

What does this mean, and how would this, the implementation of premium diesel fuel affect the value of California San Joaquin Valley crude and the availability and cost of diesel?

If a higher cetane number, such as 50 minimum, and a cetane index of 45 minimum is established, it would have a negative impact on California.

San Joaquin Valley crude oils provide a diesel fuel fraction that has a naturally lower cetane number and cetane index, but -- while providing higher energy content and improve low-temperature properties than diesel fuel fractions made from other crude oils.

Cetane improvers can be added to a diesel fraction obtained from San Joaquin Valley crudes to increase the cetane number to meet the current diesel fuel requirement of 40 minimum cetane number.

However, cetane improvements can only do so much. As with all diesel fuels, as the level of cetane improver increases, the corresponding increase in cetane number levels off, or becomes acetonic. Because of the naturally lower initial cetane number from the diesel fraction, for most San Joaquin Valley crudes, trying to meet a 50-minimum cetane

number, with cetane improver, is impossible.

A cetane index is a number that is calculated, based on the API gravity and the mid-boiling point, or 50-percent recovery point temperature, of a diesel.

It is a function of a the crude source and the type of molecules within the diesel. Additionally cetane index cannot be increased by the addition of cetane improver or other chemicals. That's cetane index.

It is impossible to meet a 45-cetane index for diesel fractions produced from San Joaquin Valley crudes without significantly modifying the chemical makeup of the fuel.

What does this mean? If a premium diesel fuel specification is adopted that requires a significantly higher cetane number and/or a high minimum cetane index, the crude oils from the San Joaquin Valley of California could not be used to produce this "premium" diesel fuel.

There's a slight possibility, although, that significant processing may allow these crudes to be used to produce those with a higher cetane number and index. But it is unknown if it will.

If additional processing would allow these specifications to be met, it would profoundly increase the price of the fuel. If significant processing does not work, the availability of diesel fuel could be greatly reduced, especially in the agriculturally-important San Joaquin Valley.

Shortages would have to be made up from fuels imported in to California, if fuels could be found that could meet California Air Resources Board requirements for not only sulphur, but for aromatics in the diesel fuel.

Even if significant processing would allow San Joaquin Valley crudes to be used, it would reduce the value of these types of crudes to the refiner, thus decreasing the price producers would receive for these crudes. This would mean that today's marginal crude oil producers would not be able to produce at all, thus lowering the amount of California produced crude.

Exacerbating the problem, associated with proposed premium diesel fuel requirement, is distribution. Currently pipelines and most distribution outlets are designed for only one type of diesel fuel.

Pipelines, storage tanks, fuel pumps and other associated equipment would have to be added to handle the two types of Number 2 Diesel Fuel, regular and premium. Who will pay for these additional costs, or will the consumer be left with only one choice?

Here's an interesting item to note. The Joint Task Forces, previously mentioned from ASTM, National Conference on Weights and Measures, said, "Regarding the proposed premium diesel fuel specification,-- and I'll quote this -- "of the six properties mentioned the only one which consumers can easily

appreciate is the heat content, since it directly affects fuel economy and mileage."

The diesel from San Joaquin Valley crudes, as previously mentioned, has a high energy content -- in other words, a higher heating value -- due to the fact that the more dense or lower API gravity diesel has more pounds per gallon.

Also, unlike gasoline, which is rated by its octane number for performance, the cetane number for diesel is merely a measure of the ignition quality of the diesel and not a function of performance.

We feel that there is not a need for premium diesel fuel specification. And there seems to be no real consensus for a definition of premium diesel fuel. If premium diesel fuel is to become a reality, we propose to the Joint Task Forces of ASTM and National Conference On Weights and Measures, that the specification be written based on, number one, geographical areas, such low-temperature operability for states or regions like Minnesota that have cold winters or, number two, a cafeteria-style specification that would give fuel suppliers the flexibility of meeting the actual needs of their consumers. For this approach a certain minimum of properties for the diesel fuel would have to be met that exceed the existing specifications to be called a "premium" diesel.

Well, to sum things up, is there really a need for a premium diesel fuel? Also, if premium diesel fuel is to become

a reality, this would definitely impact California both in terms of crude oil and diesel fuel supply. This topic needs very careful consideration.

I thank you very much for having me present this report. And I'll gladly try to answer questions, if there are any.

PRESIDING COMMISSIONER SHARPLESS: One point of clarification, maybe, to start with.

MR. DESPOT: Sure.

PRESIDING COMMISSIONER SHARPLESS: You were talking regular and premium. So you would still have -- if you couldn't meet the premium market, you'd still have the regular market?

MR. DESPOT: Well, --

PRESIDING COMMISSIONER SHARPLESS: Yes or no? Yes?

MR. DESPOT: I don't know the answer to that because currently there's only one ASTM -- well, there's two, excuse me -- there's the low sulphur and the higher sulphur diesel fuel. But as far as a regular and a premium, I don't know if they would go with the two types of fuel, or they only just specify a "premium" diesel fuel. I don't know the answer to that.

PRESIDING COMMISSIONER SHARPLESS: But these groups you're talking about, these are industry groups. Is there --

MR. DESPOT: Well, the ASTM, of course, sets the standards for fuels.

PRESIDING COMMISSIONER SHARPLESS: But they are trade association industry people?

MR. DESPOT: They're associated with the trade, yes.

PRESIDING COMMISSIONER SHARPLESS: Right. And of course, Engine Manufacturers Associations are the folks that generally make the motors for the heavy-duty vehicles, right?

MR. DESPOT: Right. They make the engines for the automobiles or buses.

PRESIDING COMMISSIONER SHARPLESS: And they're really the driving force behind this, because they would rather have you expend the money to meet the requirements than them have to improve the technology?

MR. DESPOT: Right, yes. Very perceptive, because, yes, EMA was approached by the EPA to lower the NOx emissions. And the EMA felt the oil industry could do it. And the oil industry felt that oil would be -- it would be very cost ineffective to do it that way. So can they modify their engines to perform more efficiently and less polluting?

PRESIDING COMMISSIONER SHARPLESS: But what's interesting, I guess, about this situation is that it would be a national, if, in fact, they were to move on this premium definition.

MR. DESPOT: Right, that's correct.

PRESIDING COMMISSIONER SHARPLESS: It would be a national standard.

MR. DESPOT: Yes. It wouldn't only be California; it would be throughout the United States.

PRESIDING COMMISSIONER SHARPLESS: Right. Would that change the equation? You know, right now we have kind of a California diesel and then the rest of the U.S. Would that put you in a better position?

MR. DESPOT: Well, I think it would put us in a worse position because if there was a premium and a regular, or just a premium fuel, the premium diesel fuel could not be made from, under current technologies, from the crudes of the San Joaquin Valley. The crudes --

PRESIDING COMMISSIONER SHARPLESS: Then the crudes would have to come from somewhere else?

MR. DESPOT: Yes, the crudes or the diesel would have to be imported.

PRESIDING COMMISSIONER SHARPLESS: And what would --

MR. DESPOT: And, like Ed was saying, there is plenty of diesel available with the lower sulphur. But in California we have to also meet, not only the 500 ppm sulphur, but the lower aromatics content, too. So it would be a premium "California" diesel in that case.

PRESIDING COMMISSIONER SHARPLESS: Yes.

MR. DESPOT: So it would be complicated because of our standards for aromatics. We're the only state that has a standard for aromatics in the country.

PRESIDING COMMISSIONER SHARPLESS: Right. Well, --

MR. DESPOT: Anyway, it's an interesting item.

PRESIDING COMMISSIONER SHARPLESS: Okay. Could you just give one more piece of information, and that is: Where do you see the timing of this issue? Right now there's a lot of discussion. Is there any time benchmarks you can reveal that helps --

MR. DESPOT: My understanding is by 1999, January of 1999, don't quote me on this, but this is my understanding, that the Joint Task Force is supposed to come up with a definition or a table. And because I think the Council -- the National Conference and Weights and Measures is putting a lot of pressure on them, because premium diesel fuel has been marketed at least since 1991 in other parts of the country. And --

PRESIDING COMMISSIONER SHARPLESS: But that definition is all over the map.

MR. DESPOT: Yes, right, exactly.

PRESIDING COMMISSIONER SHARPLESS: It doesn't necessarily have all the components.

MR. DESPOT: Right, yes. What's a premium? You can go up to service station and buy some premium diesel fuel for

your Mercedes, let's say, and what are you getting for your money? And that's the biggest issue as far as Weights and Measures is concerned.

PRESIDING COMMISSIONER SHARPLESS: Now do you belong to an association that is a part of this Task Force?

MR. DESPOT: Our company does have a representative that represents our company for the ASTM. And we've voiced our opinion about, in fact, my closing statements about if a premium diesel fuel were to be defined, looking at it from a geographic area, like for vapor pressure for gasoline, for instance, it's a seasonal thing and it's also a geography thing, because for colder climates you will need a higher vapor pressure gasoline for your internal combustion engines, to ignite it.

Same thing with -- we're proposing for a premium diesel. Like in Minnesota where you have sub-zero temperatures, you'll perhaps need a lower, what they call cold-flow properties, four point, flat point, and things like that. And whereas in California, where it's not as cold, maybe you're more concerned with the energy content, because of the mountains and things of that nature, or a cafeteria style. Maybe -- because really the customer is the one that we, as an industry, have to be concerned with -- maybe the premium diesel could be made with meeting three characteristics like lubricity, cold-flow properties and maybe a third one, because there's -- like I said, they narrowed it down to six areas that were of concern.

But maybe all six don't have to be met. But it's still a question that's really debatable.

PRESIDING COMMISSIONER SHARPLESS: Okay. And your company sells -- you said it's Golden Bear Oil Specialties. What type of product does your company sell?

MR. DESPOT: Well, at one time we had 300 products on the slate. We don't make gasoline, because we process the heavier San Joaquin Valley crudes. Our lightest product is diesel. And we do make a CARB diesel. I helped develop that. And we make other products such as asphalt, modified asphalt, mosquito abatement oil, rubber extenders. We sell oil to the rubber industry. The printing ink industry buys some of our oil. So our barrel of oil goes many places.

PRESIDING COMMISSIONER SHARPLESS: Goes everywhere. Okay, thank you very much.

MR. DESPOT: Thanks a lot. I appreciate it.

PRESIDING COMMISSIONER SHARPLESS: Now we have a fill-in. Gordon, do you want to come up and fill in for Robert Cunningham.

No, no. Are you filling in for Robert Cunningham?

No, somebody else is.

MR. SCHREMP: No, he's filling in --

PRESIDING COMMISSIONER SHARPLESS: He's not filling in at all. We are moving his testimony to September the 25th.

MR. SCHREMP: To September 25th. He's filling in for Chuck Morgan.

PRESIDING COMMISSIONER SHARPLESS: For those of you who came to hear Future Refining Productions with Robert Cunningham from Turner, Mason and Company, come back.

MS. SHAPIRO: On the 25th.

PRESIDING COMMISSIONER SHARPLESS: On the 25th. So Gordon, your topic for Chuck Morgan is Arizona Fuel Regulations and Options?

MR. SCHREMP: That is correct. We are going from the macro down to the micro, leaving the Pacific Rim and going to the Sun Belt. I'll do my best for Chuck. This was a last second -- he had a family illness to attend to, unfortunately. But we'll do what we can. Thank you, Tom.

Gordon Schremp, with the Staff, Fuels Resources Office.

PRESIDING COMMISSIONER SHARPLESS: Don't do too good of a job, Gordon. We don't want you leaving us.

MR. SCHREMP: I'll do my best, then, not to do too good of a job.

All right. The outline, basically what we're going to cover, is why Arizona, where they got to go to decide to change their specifications and go it alone. There's some background there. The governor got some people together to try to look into what they should do, as well as some of their options they came up with in the timetable and an outlook on some additional

fuel regulations besides the gasoline one.

The issue at hand is Phoenix, Arizona has not only a carbon monoxide nonattainable problem, they have an ozone nonattainable problem. The ozone problem is --

PRESIDING COMMISSIONER SHARPLESS: In what category, Gordon; do you know?

MR. SCHREMP: They are in moderate at this time.

PRESIDING COMMISSIONER SHARPLESS: Moderate.

MR. SCHREMP: But the EPA is threatening to up them to serious, which in --

PRESIDING COMMISSIONER SHARPLESS: So the timeframe in which they must meet attainment standard is 1999; is that for moderate? I'm trying to remember.

MR. SCHREMP: That would be correct. But if they're being boosted up to serious, then they have -- they can extend their schedule of some of the standards they have to meet and the programs they have to implement are more onerous in their opinion.

So to avoid something like that they've got some people together to try to figure out what they should do that they could set their own destiny.

Now they have had some ozone violations. From what I can gather, briefly talking to Mobil, they have had about, I think, in excess of 20 in 1995, but only about two in 1996. Part of that is what drove EPA to consider their redesignation

from moderate to serious.

Now the governor ordered a Task Force to get together and look at the quality of the gasoline that was being sold in the Phoenix region by refinery supplier. And they suspected that the qualities of the gasoline were a little, I'd say, dirtier than CARB gasoline and may have contributed to some of the ozone episodes they had.

As a result of this investigation the quality or sort of weighted average qualities of the gasoline were run through a complex model. And it turned out not to be as bad as they though. So they thought maybe this effort by the governor's office led to a little bit cleaner gasoline being sold in Arizona which helped to contribute to a lower number of violations in 1996, although weather was cooler and does have sometimes a predominate effect on ozone formation violation.

The Task Force, as you see from this overhead, came up with 35 recommendations. They culled those down to really two more viable recommendations that have to do specifically with the formulation of the fuel and the timing at which it will be used.

What Arizona did, or the governor's office did officially was request to voluntarily opt into the Federal Phase I of the Reformulated Gasoline Program, but with sort of a minor hitch. Most areas of the U.S. that use federal reformulated gasoline have a summertime Reid vapor pressure PSI standard of

7.2 pounds. Arizona went to a slightly lower RVP of seven pounds in an attempt to reduce the number of volatile organic compounds being produced in the ozone formation.

PRESIDING COMMISSIONER SHARPLESS: So they're slightly different than the federal reformulated?

MR. SCHREMP: Yes. Slightly lower RVP.

Now there is a third gasoline option under some of the selections. And that is a performance-based gasoline. What that means is you have a 1990 baseline of what your average gasoline consisted of, you know, how many parts per million sulphur, volume of aromatic solvents, et cetera.

They looked at what they could produce, what the refineries could produce, and had a goal of reducing their VOCs by ten percent, compared to that baseline fuel. That was one of the options. But that has sort of gone by the wayside.

PRESIDING COMMISSIONER SHARPLESS: Well, that means that that benchmark is really targeted to different producers, producing different types of fuel. Ten percent against what they were -- is it what's coming into the state, or what producers are producing? I don't understand, Gordon. Ten percent of what, again?

MR. SCHREMP: It's ten percent of their baseline fuel that's being supplied to the region.

PRESIDING COMMISSIONER SHARPLESS: From anywhere? How in the heck do you enforce that?

MR. SCHREMP: Well, see, the 1990 baseline formulation is something that has already been established. So the Arizona --

PRESIDING COMMISSIONER SHARPLESS: Doesn't that vary? I mean, you know, you could have a baseline in 1990, but perhaps your supply in 1989 came from different sources. Or is that a nonissue, that they always get their supply from exactly the same place?

MR. SCHREMP: Well, it's actually a producer's regulations for the refinery. The refinery's production in gasoline to be marketed in specific area, you have a baseline for that. True, the region gets supplies from multiple producers, and they also import some material. But a refinery that is marketing into that area will have a baseline established for federal EPA Phase I regulations.

PRESIDING COMMISSIONER SHARPLESS: Just for this program?

MR. SCHREMP: Exactly. And based on that formulation, they can then offer to use a different formulation and market it in the area. And as long as they run it through -- it's a computer model that will estimate the VOC emission reduction percentage, comparing your new fuel to your baseline 1999 fuel that's already been established.

PRESIDING COMMISSIONER SHARPLESS: And they only have to do this one time?

MR. SCHREMP: It's my understanding that they have to keep records of the production of the batches and what formula they're using. But they don't have to send these records in to anybody unless they receive an audit.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. SCHREMP: But the performance, as you point out correctly, could be a bit messy, difficult to keep track of as far as the governor of Arizona was concerned. So they decided to go with some set formulas or, I wouldn't call it just a formula, Phase II RFG and CARB reformulated gasoline standards.

Now I mentioned that they went to sort of a pseudo-federal reformulated gasoline standard beginning this summer. They actually had to be in compliance at the retail level, in the Phoenix area, on August 4th. Shipments actually started in June. And I will show you a bit later some of those volume numbers.

The impetus to change the regulations from this temporary, voluntary opt into the federal program and come up with their own state-run and state-compliance program is the House Bill 2307, you see, that was passed. And it's the body of this legislation that is actually going to be sent to the EPA on September 15th for officially requesting opting out of this temporary program and going to a state-run reformulated gasoline program to help them --

PRESIDING COMMISSIONER SHARPLESS: First they

asked for an opt-in, didn't they?

MR. SCHREMP: And that was granted by the EPA.

PRESIDING COMMISSIONER SHARPLESS: And so now they've done some more thinking about it, and they're asking for an opt-out?

MR. SCHREMP: That's correct.

PRESIDING COMMISSIONER SHARPLESS: But in the meantime their opt-in started on August 4th, 1997? And their opt-out will --

MR. SCHREMP: They're opt-out will --

PRESIDING COMMISSIONER SHARPLESS: -- happen if EPA --

MR. SCHREMP: -- will be granted probably prior to June 1st of 1998, but EPA.

PRESIDING COMMISSIONER SHARPLESS: Whoa. Okay.

MR. SCHREMP: And if you look at some of the timelines up there, you see June 1st through September 30th. The intent is this program, that came from their legislation, is going to have sort of two different options for the two different ozone periods.

The summer of '98 ozone period will allow refineries to ship either CARB Phase II reformulated gasoline to Phoenix or Phase I, federal RFG.

Now in the following ozone period, which will be the summer of 1999, and --

PRESIDING COMMISSIONER SHARPLESS: So these fuels are going to be going through the same pipelines, right?

MR. SCHREMP: That is correct. The Phoenix --

PRESIDING COMMISSIONER SHARPLESS: Do they have any kind of enforcement plan?

MR. SCHREMP: The enforcement will be -- yes, they have the state-operated enforcement plan, much like the Air Resources Board has, and their own enforcement branch.

PRESIDING COMMISSIONER SHARPLESS: Yes, but we're dealing with one fuel versus a choice of Federal Phase I or CARB Phase II.

MR. SCHREMP: That is correct. It will add a level of difficulty to enforcement. But it will add another layer of flexibility to potential suppliers to the market.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. SCHREMP: So they probably weighed both of those options.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. SCHREMP: When they start the second phase in 1999, that will be year round from that point forward.

This is a timetable looking ahead at some anticipated dates. There will be an official submittal September 15th of this year. Their Department of Environmental Quality will have finalized the rules. They will officially submit to the Environmental Protection Agency. And in that submission will be

their, you know, the guts of the plan, and how their state implementation plan will be revised to still remain in compliance.

PRESIDING COMMISSIONER SHARPLESS: Does that mean that, based on this new reformulated gas, that they'll meet their attainment standard by 1999, based on their models?

MR. SCHREMP: That is correct. They are looking at a specific number of tons-per-day reduction to be anticipated using this approach -- that is correct -- and still maintain and not have to be bumped up to another designation.

PRESIDING COMMISSIONER SHARPLESS: And what did they estimate would be the increased price in fuel?

MR. SCHREMP: The information that I have read, I haven't seen much data on price estimates. I would think that, being a landlocked market, without any suppliers, dependent on mostly pipeline deliveries, sort of lends yourself to the risk of spot outages of your pipeline. And, therefore, you could have some pretty good volatility in prices from time to time. And that has prompted something probably more to worry about than maybe some incremental cost of cleaner-burning gasoline.

PRESIDING COMMISSIONER SHARPLESS: Okay. Gets the implications on our own market, too, doesn't it, Gordon?

MR. SCHREMP: You could say that.

The purpose of this box diagram is to show you that for 1997 ozone season, which is this summer, it is this Federal

Phase I or RFG which is seven pounds Reid vapor pressure. But for the ozone season of 1998 there is the option of this same gasoline they're using now, as well as the gasoline that we are using in this state. Both can be shipped to the Phoenix area. But starting in 1999 it will be a Federal Phase II gasoline and still CARB reformulated gasoline.

Now a little bit of difference between Federal Phase I and II. Basically it's not so much a recipe. You're comparing what you have in your 1990 baseline. You're trying to achieve even greater VOC reductions, as well as toxic reductions, which are basically benzene. And I think it's my understanding that I believe sulphur and olefins come into play about trying to achieve lower reductions from your baseline.

PRESIDING COMMISSIONER SHARPLESS: So this is -- you're describing the difference between Federal Phase I and Federal Phase II?

MR. SCHREMP: That is correct.

PRESIDING COMMISSIONER SHARPLESS: And they're going to allow a predictive model?

MR. SCHREMP: That's a good question. I don't know -- when you see that CARB reformulated gasoline is one of the options to deliver to the area -- if it can be based on the predicted model.

Now California has the three main approaches to trying the meet the regulation: a simple formula, an averaging

standard and, what you just mentioned, a predictive model. So I don't know if they can do that or not. I would have to check with the -- I guess with the Air Resources Board to see if they would allow that.

But this is, I believe, some information that was produced by a company called Math Pro, during some of the negotiations, about what the regulations should be. And they were just trying to compare some of these, the VOC and NOx reductions that could be achieved through the use of either of the two fuels, Federal Phase II and CARB RFG.

I believe there's lots of argument, depending on where your perspective is, on: Are these numbers valid or not. But this is what the government was accepting at the time.

PRESIDING COMMISSIONER SHARPLESS: Well, it also depends on what Arizona needs to do to -- what kind ozone strategy Arizona needs, whether it needs both NOx and VOCs, or if it's heavier on the VOC and less on the NOx area.

MR. SCHREMP: That is correct. And I don't know what the various percentages are, as well as they do have some stationary source of VOCs and NOx that they are also targeting as part of their strategy.

A final slide that I'm not sure if you received in your package. I don't know if you have that before you, --

PRESIDING COMMISSIONER SHARPLESS: Yes, we do.

MR. SCHREMP: -- is CARB diesel with a question mark.

And I asked him about that a little bit. And the intent here is that not only is the gasoline regulation going to undergo some, I guess, pretty dramatic change in the next couple years in the Arizona market, but there is the thinking that carbon monoxide, which is also a problem for the Maricopa County, there may be a role for a cleaner-burning diesel. And in some way the sulphur levels in diesel, there's some interaction that can decrease your carbon monoxide emission.

I personally don't understand the relationship. But Mobil tells me there is some linkage there. So maybe a cleaner diesel can be in their future. They're going to be looking at this and pushing for some of this.

And the winter gasoline is -- I mentioned that the ozone strategy of using a cleaner-burning gasoline is a summertime phenomenon. They will actually, in the winter of '97-98, transition back to a winter gasoline, which means they will oxygenate with either MTBE or ethanol.

There is a minimum standard that is higher than California's. If you're using ethanol, it's ten-percent minimum by volume to oxygenate. And if you're using MTBE, it's 15 percent by volume, minimum. And they feel that a good strategy is to have as much oxygenate in the gasoline as possible, in an attempt to reduce their carbon monoxide emissions, yet not achieve some NOx violations.

Now that's just the regulation. How about, since this

is actually ongoing, how are we doing? The gasoline is being made and the gasoline is being sold and used in the region. So we're going to be covering where the gasoline comes from, how much of it comes from California refineries, and what impact there could be on our production of reformulated gasoline. And a little bit of a look ahead of what next couple of years might entail.

This next graphic is sort of a ten-week play-by-play of what gasoline was being delivered to the Arizona market from both the west pipeline and the east pipeline. Pipelines provide probably in excess of 90 percent of the gasoline in Maricopa County. Some fuel is brought in from Las Vegas and from California, as well as from New Mexico from time-to-time, but very small amounts.

So the averages there are about 76,000 barrels per day of reformulated gasoline being delivered to the Phoenix area, about 16,000 from the east and 60,000 barrels a day from the west, which is 75 percent, if it comes from the west.

Now that's a little bit larger breakdown than historical gasoline deliveries. About two-thirds of the gasoline being delivered to Phoenix in the past, recent past, was from the west line and a third from the east. So there's been a slight shift to the west. But there is still capacity in the line to handle increases in volume.

And the slide that Tom has up there now is an

examination of the refineries. I call them the West Coast Arizona RFG Producers. This is looking at only those refineries in California that are producing CARB gasoline conventional and Arizona reformulated gasoline.

It sort of gives you an --

PRESIDING COMMISSIONER SHARPLESS: Gordon, can I ask you?

MR. SCHREMP: Sure.

PRESIDING COMMISSIONER SHARPLESS: You know, we're looking at a period of like two months. If we were to make it a 12-month, would we see much variation?

MR. SCHREMP: You may not see very much variation due to the Arizona regulation alone. You would more likely see a great deal of variation for other reasons. Minor problems at the refineries are major problems, changing crude slates, changing market patterns.

Maybe you want to concentrate more on distillates and jet fuel, or conventional gasoline, too, for the Pacific Northwest, et cetera. There's lots of reasons these numbers can bounce around.

PRESIDING COMMISSIONER SHARPLESS: Okay.

MR. SCHREMP: But this is just giving an idea that these refineries in California are not just a California refinery. They do make conventional gasoline for export. The Arizona reformulated gasoline in the white in the middle for the

Phoenix market. And the largest portion is actually for the California market.

And the total numbers, there's about 500,000 barrels per-day production capacity shown there for those ten weeks, of which 70,000 barrels a day is Arizona, 60,000 conventional, and the remainder of 370,000 barrels a day is CARB-reformulated gasoline.

And it is interesting to note we did a survey several months ago. We called around, found out who would be producing reformulated gasoline for the Arizona market, and had them -- or we just put the numbers in the spreadsheet to see how they came out. And there a number we had was 70,500 barrels per day coming out of the west. And so they've averaged 70,000 barrels a day to date.

So it may be a little bit of a coincidence, but they are pretty honest in some of these confidential surveys that we do undertake.

Before we turn to the next slide, the reason we were keeping an eye on this, there were several people that expressed concern to us that maybe when the refineries in California started producing Arizona-reformulated gasoline, it would be done at the expense of CARB reformulated gasoline and would hurt the power market, increase the demand out here or reduce supply and drive price up a little bit.

So in an effort to take a look at that, I examined --

sort of -- I looked in the same ten-week period in 1996. I saw what percent of their gasoline production was CARB. And I looked in this same ten-week period in 1997 to see what percent was CARB.

And at first glance in '96, 82 percent of the total gasoline production was CARB. And it has dropped down to 74 percent in 1997. So you might think, well, maybe it has impacted. But that's just the percentage of gasoline being produced.

Total barrels for the same two periods of time being compared show that, in fact, there's been a slight increase in the amount of CARB-reformulated gasoline at these refineries. So they have been able to handle the ability to make Arizona-reformulated gasoline, CARB and conventional. And they've actually increased total production.

Now there's several reasons this can occur. In the 1996 time period you could have some slight decrease in inputs, because of refinery problems. And in 1997 a gasoline they used to send to Arizona that was conventional, that was being splash-blended in the wintertime, was slightly less in volume.

Now they're adding 11 percent by volume MTEB to this formerly-conventional fuel and shipping on the pipelines. So that has increased the volume slightly on the right-hand side. But, as you can tell, really no impact on this group of refineries' ability to make CARB-reformulated gasoline.

And the market, it's going to be -- I won't say it's unique -- but what will be nice to watch is how the flow is going to the Phoenix area. They, right now, are responding to the price difference. The California-reformulated gasoline price currently is fairly elevated compared to what the price is fetching in Arizona.

So, as a result, you're seeing -- if you went back a couple of slides that you can do at your leisure, you can see that there's been a slight reduction in Arizona production in California and that the numbers are going to be getting greater flowing in from the east, because some refineries have the ability to supply from both directions or to exchange barrels.

So to look ahead at something to do with that, in Maricopa County or in Arizona specifically, the gasoline demand has been going at a fairly healthy clip for the last three years, about four percent plus per year.

In Maricopa County the gas demand is even greater and is not expected abate any time soon. So it's quite a good growth market. So those numbers that you see being delivered into the region of -- I don't know, when we talk about 76,000 barrels a day -- those will go up over the next couple of years. They're expected to go up.

But if the California refineries are producing anywhere between 900,000 and a million barrels a day of CARB-reformulated gasoline, another 20,000, 40,000 barrels a day of reformulated

gasoline going to Phoenix is not quite a drop in the bucket, but it is a small amount compared to the grand scheme of things.

So we don't see that as too much of an impact on total demand for CARB gasoline because in 1998, 1999 they can use CARB RFG in this market. So they may just take from inventory and from production and ship it to the east.

Some other developments, refinery upgrades outside of California. That has more to do with Federal Phase II regulations that will kick in in the summer of '99. There is an anticipation that work will be performed on some domestic refineries to allow them to be in a better position to meet the Phase II specifications for federal RFG areas.

Simply put, that means they will probably be in a better position to have some more desirable blending components. And they could mix and make CARB RFG and send to our market from the Gulf Coast, for example. So we anticipate that there will be possibly a larger available supply pool, outside of California, in the event that we do need to bring in some imports when we have an unplanned action. That's precisely like what happened with Shell in April of 1996.

I mentioned future pipeline expansion projects. That has mostly to do with how the region is being supplied from the east. There essentially is a common-carrier pipeline that runs from the El Paso, Texas region into Tucson, and then a pipeline from Tucson up to Phoenix.

There are some refineries in El Paso, but they're not as sophisticated as some of the California refineries. Not all of them can produce CARB -- or excuse me -- Arizona-reformulated gas, let alone CARB-reformulated gasoline.

So there are some other projects that are bringing some pipelines into the El Paso region that will allow possibly some material coming from the Gulf Coast, which will open up from the east the ability of refineries that are capable of making CARB gasoline, as well as Federal Phase II, to get into the Phoenix area.

And what that means is it would help take some pressure off the west, for example, if there were a greater ability to supply from the east than there currently is. There is a limit right now because of capability as well as pipeline access to El Paso. There doesn't seem to be a problem with capacity, once you're at El Paso, in getting the material on into Phoenix.

PRESIDING COMMISSIONER SHARPLESS: Is there actually a pipeline expansion proposal that somebody's pursuing from the Gulf?

MR. SCHREMP: Actually there are smaller segments that will connect existing pipelines, convert some crude lines, change the direction in which you pump the line, things of that nature. They're smaller, not a line, one line that runs all the way from the Gulf, no.

PRESIDING COMMISSIONER SHARPLESS: But are they

underway so that they connect several different pipelines?

MR. SCHREMP: Yes. It's my understanding there is one project underway that will increase, I guess, barrels to the El Paso region by about 20,000 barrels a day. So, as you can see, I mentioned, you know, 40,000 barrels over, you know, several years. I mean, that certainly would be enough right there. But as the nature of the pipeline expansion business goes, it goes in fits and starts.

You'll have overcapacity by the nature of the business. You have to build the expansion of a certain size. It's plenty for a while, then it gets tight. But these pipeline projects take awhile to get completed.

So I don't foresee a problem supplying the region from, you know, either the east or the west direction. And I don't then it's going to have detrimental impact on the California market at this time.

I would be happy to answer any questions you might have.

PRESIDING COMMISSIONER SHARPLESS: Gerry.

MR. BEMIS: Gordon, not meaning to put you on the spot, or anything, because I know you're filling in. But maybe you can clarify this, just for the record, at least.

The title of the presentation was Arizona Fuel Regulations and Options. And Chuck used the term "Arizona RFG," or "cleaner-burning gasoline." Yet in the details you started

talking anybody narrowing it down to Maricopa County. And also we talked about Phoenix. So I want to clarify what is the geographical extent of the application of this regulation?

MR. SCHREMP: That's a very good question. And I apologize for not covering that during my presentation. It's also a very good question because even the feds have trouble explaining what that geographical boundary is. Essentially it is -- the official title is the Carbon Monoxide Moderate Nonattainment Region in Maricopa County, which is almost the geographical boundary of Maricopa County, but not quite.

I think there's over 28 direction changes if you were to pull directions off the Internet and try to create this map. But it's almost all of Maricopa County, is the Carbon Monoxide Moderate Nonattainment area. And that is the region that the Arizona State Government selected to market the gasoline, the reformulated gasoline in.

MR. BEMIS: Is there any chance that area could be expanded to other areas on Arizona?

MR. SCHREMP: Not at this time, from what I've seen and from the information generated by, not only the Task Force, but in this House bill. Other areas weren't a concern, such as Tucson, for ozone violations. There are other regions in the state that do continue to have a carbon monoxide nonattainment problem and will continue to use winter oxy gasoline.

MR. BEMIS: Thanks.

MR. SCHREMP: You're welcome.

PRESIDING COMMISSIONER SHARPLESS: Any other questions?

Gordon, thank you. It was a good job on both perspectives.

MR. SCHREMP: Well, thank you for your time.

PRESIDING COMMISSIONER SHARPLESS: I'm going to ask if there are any questions from the audience on any of the presentations or comments that they wish to make?

Hearing none. Actually we had, as an option, the ability to put a panel together and discuss some of the implications of the information we've received today on California impacts.

Tom, I think we've kind of done it, as we've gone along, unless you feel as though there are some issues that need further discussion?

MR. GLAVIANO: I think we've covered almost everything through the questions and answers.

PRESIDING COMMISSIONER SHARPLESS: Almost.

MR. GLAVIANO: I just have one question for Ed Kraples, if I may. It's kind of a question that's been nagging me since 1978. So I --

MR. KRAPLES: Yes, I got my derivatives question in and yours now.

MR. GLAVIANO: It's a mathematical question.

PRESIDING COMMISSIONER SHARPLESS: Everybody who had a nagging question asked you today.

MR. GLAVIANO: You know, we used to characterize the embargo of '73, Arab embargo of '73-74. And a lot of people mischaracterized another embargo in 1978. But actually it was a tight supply by the Iranian revolution causing the problems.

But I've heard mentioned several times that people are hard-pressed to find that actually physical barrels were removed from marketplace in terms of production. And the reason I asked that is because, when we deal with CARB diesel during the tight supplies, we see an increase in price. And we see demand increasing, but we see it as container demand, yes.

PRESIDING COMMISSIONER SHARPLESS: It's in the ground, Tom. It's in the ground.

MR. GLAVIANO: And I'm just wondering if the '78 experience was something similar to that? Do you have anything?

MR. KRAPLES: I was in a really unique position. It's actually 1979 when the Iranian crises occurred. I was lucky enough to get a commission from the State Department to look at why there appeared to be this big shortage, defined as a lot of price pressure when you *ex post* that there really was not a reduction in supply.

So I got enough money to go literally around the world. I visited 25 different countries. And I looked at the question of hoarding. And it's exactly as you say. There is a

tremendous tendency on the part of consumers, and wholesalers, and retailers, when things get tight, to take in as much supply as they can.

And when I measured this phenomenon on a country-by-country basis, making some heroic guesses on the tertiary, or consumer-storage thing, the build in inventory could have been, worldwide, as much as two or three millions barrels per day for a year. Meaning that we may, as group of panicked consumers, have put as much as billion barrels away, fearing that the crisis would last indefinitely.

And I came out of that research thinking that if governments could find a way to deal with the hoarding impulse that that is really a tremendously useful step in crisis management. And that, again, a stockpile of significant size is a good way to do that.

And I'm sure that some of your price run-ups that you've experienced here, especially as these markets splinter into very particular state-level sophisticated fuels, that you do have a hoarding impulse. And you probably quantify how big a force that could be by just looking at the storage capacity that exists at the tertiary and secondary level and making an assumption about how full that is. And we've done that in heating oil, for example.

You say if everyone fills their tank at the same in New England, it's a tremendous flow. And it does create shortages

and outages and tremendous price pressures.

COMMISSIONER MOORE: Does that go to your point earlier? You made just a passing comment about the SPR in saying that they were draining it down and, in fact, they ought to be pushing it up. Would that suggest that, in fact, if you had an estimate of what the crisis produced in terms of hoarding resources, if it was a factor of half the capacity -- I just made that up -- 50 percent, you knew what that number was. And you multiplied that times the time for a crisis to really pass, six weeks maybe, before the momentum passes off of it, that you could come out with a number that really ought to be in storage, plus reserve?

MR. KRAPLES: Yes.

COMMISSIONER MOORE: And that you ought to never drop below that?

MR. KRAPLES: Yes. And you know that approach to sizing the SPR has not been used inspite of the good research that -- or bad research -- that people have done, because at the end of the day the approaches tended to be more economic, if you will, than engineering.

And I think that's a mistake. And so we're not drawing down the stockpile. We've taken 40 or 50 million barrels out of it, which I think is just so short-sighted. And, to the contrary, we should be doing just the opposite.

COMMISSIONER MOORE: Right.

MR. KRAPLES: But we're not. So I've often wondered whether there was a state-level solution to that problem, not so much in the product markets, because I think product storage is a different animal than crude storage. But in the crude market, why not have a state-level crude reserve?

COMMISSIONER MOORE: You know, there really isn't any reason why not. And it seems to me one of the drawbacks of doing that, though, is that you hold a reserve like that, and then when the crisis comes you don't ever use it, at least not in the way that we've just been talking about now. And that maybe the better approach would be -- and it might take some executive management that's pretty bold, if you will, but the next crises that comes along you really do dump the reserves.

MR. KRAPLES: You really do dump it.

COMMISSIONER MOORE: You just systematically dump it out on the market and diminish the tendency to hoard. Do it again the next time it happens. And then I'd say twice, maybe three times, and pretty soon the market comes to expect that.

MR. KRAPLES: Absolutely.

COMMISSIONER MOORE: And you won't, in fact, hoard your strategic reserve, which we have a tendency to do, but, in fact, will put it on the market in such a way that it diminishes the tendency of the consumer to hold that.

MR. KRAPLES: I agree. If you hit traders --

PRESIDING COMMISSIONER SHARPLESS: I don't know, I

get a little nervous while listening to some of this because it depends on what you define as a crisis. As somebody pointed out in the Kuwaiti situation, prices shot up pretty high, but not for very long, because the market responded. And in some cases we have our stability today to thank for the fact that we suffered through some crisis, because it sent signals to market to go out and look elsewhere. And then if we're just fat, dumb and happy and every time there's a bend in the road, somebody, government takes an action to throw something at a market response, we actually are dampening a market response. And I'm a little bit more cautious of that.

One of things that we've done in California, and I don't call these crises. These are blips in the marketplace. When the prices spike, and people react, and maybe go toward hoarding, one of the things you do is to provide information. The government provides information to say this is why it's happening; it's not a long-term thing; market's responding, and if you hoard, you're going to make it worse, folks, and go.

But I think Michal is getting to the bigger crisis.

COMMISSIONER MOORE: Yes. Well, the upshot of that, of course, is that if you believed in the market that much --

PRESIDING COMMISSIONER SHARPLESS: Damn, I do.

COMMISSIONER MOORE: Right. You know, I like -- if I come out of this as a free-market economist -- or I came into this game as a free-market economist. But that doesn't diminish

the need for some residual regulation in the energy field. There will always be some sort of regulation. I guess my point would be if really you believed in the markets that much then there'd be no need to maintain a strategic reserve at all. You simply wouldn't have it.

MR. KRAPLES: Can I distill that?

PRESIDING COMMISSIONER SHARPLESS: Not going that far, Michal.

MR. KRAPLES: Can I --

COMMISSIONER MOORE: Well, all right. You don't go that far, then --

PRESIDING COMMISSIONER SHARPLESS: It's just when you use it --

MR. KRAPLES: Can I distill that in --

PRESIDING COMMISSIONER SHARPLESS: -- is the argument, when you use it. And earlier today you were talking today you were talking about how you were trying to convince Congress to use it during the Kuwaiti War earlier than they did, and it had little effect when they decided to release it.

MR. KRAPLES: Well, there was a particular moment in time in the Gulf war when I think the world could have changed but didn't. And that is when Saddam was at the border with Saudi Arabia. Had he penetrated Saudi Arabia and taken the oil fields, then the crisis that we had all been fearing was that one in a hundred crises would have occurred.

At that point you probably had to use the stockpile, because you'd have $100 a barrel of oil. And you would use the stock drawdown period as a period in which you mobilized your forces to take the oil back.

It seemed to me that somewhere between the two points of view that you've expressed, which are exactly the argument that occurred within the administration in August of 1990, exactly the two positions. Your position was the position of Nicholas Brady, the Treasury Secretary, and your position was the Energy Secretary who wanted to draw down the stockpile.

There was a resolution of that argument that could have been embraced but was not, which is: dedicate the small portion of the reserve, 50 million barrels, 10 percent of it, to what you might call tactical firefighting and use that in combination with your public information program, because I think you're absolutely right.

If you drawdown the big stockpile, then you would have maybe signaled the consumer that the crisis was worse than it really was and it might have encouraged the hoarding. There is that concern.

So I've also often thought if you had a tactical and a strategic stockpile, the tactical one you're drawing down all the time, the strategic one you don't touch until a really serious crisis, that that's an interesting crisis management program to speculate about.

And, again, that would work much better at the federal level than at the state level. If you did it here in California, would you be subsidizing Arizona, Washington? I'm sure you've had this discussion many times. And the answer is yes, of course, you would. So why do it at the state level? If you're going to do it, do it at the regional level.

PRESIDING COMMISSIONER SHARPLESS: And trade for avocados and grapefruit.

MR. KRAPLES: Exactly. Or we're talking with the Japanese government about an Asian stockpile, because truly the Gulf Coast stockpile is not going to have as beneficial an impact for you as it will have to people in the rest of the country. There is a need, I think, an urgent need for a big Asian stockpile to protect the Asian economies against the disruptions that we know will occur. There will be some in the next ten, twenty years. And except for Japan, Asia is fairly unprotected.

PRESIDING COMMISSIONER SHARPLESS: Does that answer your question, Tom?

MR. GLAVIANO: That answers part one.

PRESIDING COMMISSIONER SHARPLESS: Oh, oh-o.

MR. GLAVIANO: I've also had another question that's been bothering me since 1978, also. And you mentioned that a trading group in Singapore was able to push the diesel market and cause prices of maybe five-cents-a-gallon price increase in

California.

As refined products become more of a commodity, and in a fractured market such as California, where you have thin markets for diesel, 150,- to 200,000 barrels a day production -- or demand. How significant is the ability of traders and third parties to move prices, independent of, to a certain extent, the market forces of supply and demand?

MR. KRAPLES: Yes. I think it's a significant concern in that if you -- the Japanese have this concern, too. And again this might be an area where you do have a regional interest in developing a depth to these product markets that doesn't exist today. And I expect in north Asia that we'll see some market depth develop as deregulation creates a real need to have real markets as opposed to this funny, little thin market in Singapore.

So I think you are vulnerable to manipulations in the Asian market, more so than any other part of the United States. You're really the only part of the states that has this vulnerability.

MR. GLAVIANO: Okay, thank you.

PRESIDING COMMISSIONER SHARPLESS: Thank you. I think you've answered all of the nagging questions we've had for at least two decades.

MR. KRAPLES: Maybe not satisfactory, though.

PRESIDING COMMISSIONER SHARPLESS: Some of them.

But we'll come up with new ones. I want to think you very much for your time, and Staff, for your work and effort, and those who have participated, for being here.

And that concludes our program for today. Again I announce that we have our next hearing on September 25th, in which we'll deal with the refining issue; is that correct?

MR. GLAVIANO: And price volatility.

PRESIDING COMMISSIONER SHARPLESS: And, excuse me?

MR. GLAVIANO: And product price volatility.

PRESIDING COMMISSIONER SHARPLESS: And product price volatility. So until then, have a safe trip home. Thanks a lot.

(Whereupon, the hearing adjourned at 3:04 o'clock p.m.)

---o0o---

CERTIFICATE OF REPORTER

I, **GEORGE PALMER,** a duly-commissioned Electronic Reporter of **Palmer Reporting Services**, do hereby declare and certify under penalty of perjury that I have recorded the foregoing Fuels and Transportation Committee Hearing, on the World Oil and Supply Production Issues, Docket No. 96-FR-1, which was held and taken at the **STATE of CALIFORNIA ENERGY COMMISSION,** in Sacramento, California on the **21st day of August 1997**.

I also declare and certify under penalty of perjury that I have caused the aforementioned hearing to be transcribed by Susan Palmer, a Certified Electronic Transcriber, Number 000124 by the American Association of Electronic Reporters and Transcribers, and that the foregoing pages constitute a true and accurate transcription of the aforementioned hearing.

I further certify that I am not of counsel or attorney for any of the parties to said hearing, nor in any way interested in the outcome of said hearing.

Dated this **1st day of September 1997** at Manteca, California.

_____

GEORGE PALMER

ELECTRONIC REPORTER